FREDERICK COUNTY

Bikeways & Trails Plan

County Council Approved Plan

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Division of Planning & Permitting

Frederick County

Bikeways and Trails Plan

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1. Introduction

Plan Overview and Scope

The Frederick County Bikeways & Trails Plan was first prepared and adopted in 1999. The 1999 Plan proposed over 174 miles of combined natural surface and multiple-use trails along with 334 miles of On-street bikeways. The Plan also developed design standards for both off-street trails and on-street bikeways. Since 1999 the City of Frederick has adopted its own Shared Use Path Plan (2002) and has been very active in developing off-street paths and on-street bicycle facilities within the City. Also of note since 1999 there has been a significant increase in the advocacy by citizen organizations to construct bicycle facilities in the City and County.

The adoption of the 2010 Frederick County Comprehensive Plan includes an action item which specifically calls for an update to the 1999 Plan. With this in mind, the purpose of this Bikeways and Trails Plan update strives to achieve the following:

- Incorporate related goals, policies, and action items from the 2010 County Comprehensive Plan, and be consistent with the draft Livable Frederick Plan.
- Assess the off-street trail corridors identified in the 1999 Plan to refine their scope and to either add new corridors or remove corridors from the Plan.
- Assess the on-street bicycle facilities in the 1999 Plan for revisions, additions, or deletions.
- Expand the Plan to include a pedestrian component and how the planning and design for both pedestrian and bicycle/trail facilities need to be considered in a comprehensive approach.
- Include the consideration of a Complete Streets policy that could be adopted.
- Address the coordination of planned county path and bicycle facilities with both regional and municipal facilities that either exist or are planned.
- Identify implementation and funding opportunities.

With a countywide focus, this Plan is meant to recommend a conceptual framework for multi-use trails and bicycle facilities and will not provide any detailed design or engineering for a particular facility. The Plan recognizes that there will need to be follow-up studies conducted to address overall feasibility, design, and operational issues. Identification of a trail corridor in this Plan does not guarantee that it will be developed if further studies find either engineering feasibility or operational issues that may result in a particular corridor being dropped from consideration. The 2018 Livable Frederick Plan is in alignment with this plan, and subsequent corridor plans would be expected to use this plan as a starting point for further detailed assessment.

An effort has been made to be consistent with like plans from the State, local municipalities, the City of Frederick, and neighboring counties, federal agencies (e.g., Monocacy Battlefield) and the Metropolitan Washington Council of Government. This would help maintain continuity of facilities at political borders and accommodate longer term travel.

Unlike the 1999 plan, this plan addresses pedestrian infrastructure needs and issues such as sidewalk networks, crossing improvements and safe (walking and biking) routes to school. Walking is the first and most basic method of transportation. Nearly everyone is a pedestrian at some point each day, even if it is simply walking from the car to the office.

Plan Concept and Framework

This Plan will implement the emphasis on a multi-modal transportation framework established in the 2010 County Comprehensive Plan under the Providing Transportation Choices chapter. The focus of a balanced, multi-modal transportation system provides mobility for the general population with automobiles but also for people who may not be automobile dependents. Bicycle and pedestrian facilities are but one component of a multi-modal transportation network necessary to address existing and future mobility needs in the county.

The Comprehensive Plan has adopted the following goals and policies to guide the implementation of a multi-modal system and specifically support the pedestrian and bicycle components.

GOAL

TR-G-01	Plan a safe, coordinated and multi-modal transportation system on the basis of existing & future development needs, land uses and travel patterns.
TR-G-02	Integrate transit, pedestrian, bicycling and ADA accessible facilities into the County's existing roadways and communities and the design of new roadways and communities.
TR-G-03	Maintain and enhance the quality of the transportation system to assure an acceptable level of service, safety and travel conditions for all roadway users.
TR-G-04	Reduce the need for single occupancy auto use through travel demand management and increasing the share of trips handled by bus; rail; ride-sharing; bicycling and walking.

Policies

TR-P-15 *Accommodate safe use and access in the design and maintenance of all developer or County funded road projects by public transportation, cyclists, pedestrians and users with disabilities.*

TR-P-06 *Support the implementation of the Countywide Bikeways and Trails plan including identifying needed sidewalk, shared-use path, on-street bikeway improvements; maintenance; education and enforcement.*

TR-P-07 *Ensure commercial and residential development constructs shared use paths and on-street bikeways designated in the County Bikeways & Trails Plan that pass through or immediately adjacent to their proposed development site. Easements in lieu of constructed improvements may be provided in the case of shared use paths.*

TR-P-08 *Prioritize bicycle and pedestrian network implementation based on providing safe and functional transportation connections between residential, employment, recreational, shopping, schools and transit centers.*

TR-P-09 *Pursue the shared use of existing and proposed publicly and privately owned utility right-of-ways for the purposes of establishing shared use path facilities.*

TR-P-25 *Employ Transportation Demand Management (TDM) options such as ridesharing, transit provisions and incentives, commuter outreach programs, non-motorized and ride-sharing transportation facility provision, community outreach, tele-work and parking demand management as an integral part of county, developer, and state roadway projects in Frederick County.*

TR-P-16 *Foster close coordination between Frederick County and the Maryland Department of Transportation; the Metropolitan Washington Council of Governments; and adjoining jurisdictions on matters related to funding; management of existing transportation networks; planning and programmed improvements; data collection and modeling; emergency through routes; land use plans and coordinated legislative actions.*

TR-P-20 *Identify and improve the location and alignment of new roads, bicycle/pedestrian connections and transit links in advance of future need to coordinate establishment of right of way requirements and access control.*

TR-P-03 *Maximize transportation network connectivity by providing an interconnected street and transportation network within and between new and existing development.*

TR-P-10 *Encourage higher density and mixed use residential and employment centered transit oriented development in growth areas that are served by or could be served by rail service, local and regional bus transfer points, shared-use paths and ride-sharing facilities.*

In this Plan the goals have been organized under broader goal statements that also provide structure for the organization of the draft Plan. These goals, which need to be measured annually to gauge performance and attainment, are as follows:

VISION STATEMENT

Frederick County is a community where bicycling and walking are viable modes of travel for recreation and transportation purposes. A network of bikeways and multi-use trails are safe and convenient connections between municipalities through improved access to recreational, historical/cultural, commercial, and employment areas.

GOALS

GOAL: SAFETY | ENCOURAGEMENT

To reduce the number of cyclist and pedestrian crashes in Frederick County.

- Provide bicycle facilities that offer safe riding for basic cyclists.
- Develop local law enforcement programs and educational efforts to promote safe and courteous bicycle use on trails and roadways.
- Encourage public/private partnerships and volunteerism for trail construction, maintenance and safety patrols.

GOAL: CONNECTIVITY

To provide safe options for non-motorized transportation and recreational trips for residents and visitors, accommodating all ages and abilities

- Provide recreational bikeway access or trail connections to all ages and abilities of users, to existing and planned park and recreation facilities, schools, libraries, and cultural/historic sites.
- Develop bikeway and trail corridors that connect with existing and planned regional facilities beyond Frederick County.

GOAL: OPPORTUNITY

Increase the proportion of work and transportation trips by walking and bicycling.

- Provide pedestrian and bicycle connections and access between residential, commercial, employment, and educational institutions to accommodate all ages and abilities of users.
- Provide bicycle and pedestrian access along with bicycle parking to MARC stations, local TransIT bus stops, commuter bus stops, and park and ride lots .

GOAL: PLANNING | DESIGN | IMPLEMENTATION

Accommodate pedestrian and bicycling designs up front in the planning and design of our roadways and communities.

- Support a Complete Streets policy for new road construction and for improvement projects on existing roads.
- Develop corridors/facilities that meet the shared needs of cyclists, walkers/hikers, equestrians, and other leisure users.
- Accommodate bicycle and pedestrian access into the design of new development and existing communities impacted by development.
- Evaluate the opportunity for bikeways and trails in existing and proposed utility lines, existing and abandoned railroad lines, and along waterways.
- Seek funding sources for bicycle and pedestrian projects.

The implementation of a balanced multi-modal transportation network must also be supported by fostering mixed use neighborhoods and through the location of community facilities. The 2010 Frederick County Comprehensive Plan includes the following policies on Managing our Growth and Serving our Citizens chapters that further support bicycle and pedestrian use.

MG-P-05 Locate and design development so as to foster the formation of communities that respect Frederick County's traditional growth patterns characterized by distinct and clearly-defined neighborhoods and commercial districts, pedestrian and bicycle-friendly circulation patterns, and a vital mix of residential, business, and civic uses.

SC-P-01 Place major facilities such as schools, libraries, fire/rescue facilities and senior centers within community growth areas with an emphasis in the central portion of community growth area, preferably adjacent to commercial centers.

SC-P-10 Maximize the use of school sites through the construction of multi-story buildings to reduce building foot prints and emphasizing bicycle and pedestrian access to minimize parking needs and bus transportation.

Benefits and Opportunities of Bicycling and Walking

Planning for bicycling and walking facilities are key ingredients to building a successful on-street and off-street network system and fostering the growth in both types of transportation in a community. There are numerous benefits from bicycling and walking in Frederick County including improved air quality, quality of life in health recreation, economic, and accessibility or mobility.

The Natural Environment

The most obvious benefit from increasing opportunities for walking and cycling is the reduction in vehicle trips, and an associated per- capita reduction in vehicle miles traveled and auto emissions. The replacement of an auto trip by walking or cycling is especially beneficial for short trips of about three (3) miles or less for biking and one mile or less for walking.

Quality of Life – Health and Recreation

Non-motorized transportation can also serve health and recreational purposes which in turn can improve the quality of life both for individuals and for the community as a whole. The recreational aspects of bicycling and walking offer the broadest opportunities to engage people of all ages and physical abilities. From an infant being pushed in a stroller to an elderly person using a wheelchair, a sidewalk or shared use path can arguably be used by 100% of a community's population.

Additional benefits of increased bicycling and walking is improved health and therefore reduced healthcare costs for all ages. From obesity, diabetes, to asthma and injury crashes, improved access and safety of bicycling and walking can contribute to better health.

Reiterating the theme from the County Comprehensive Plan is the concept of providing transportation choices. Whether it is the ability to choose, for those who have access to an auto, or accommodating those who do not have access to automobiles, providing choice in transportation modes is important way to maintain a balance and equitable transportation system. For citizens who have the ability to choose any mode of transportation, not having safe bicycle and pedestrian accommodations between their origin and destination will often limit those travelers from choosing bicycling or walking for even the shortest trips. In addition, a certain percentage of county residents do not own a car either by choice or because of income limitations. For this segment of the population, adequate bicycle and pedestrian facilities are necessary means to travel.

Economic Development and Tourism

Economic benefits can be realized through increased home property values in close proximity to trails and from tourism related spending. The amenity value of bicycle and pedestrian facilities can translate into increased property values and enhanced tax revenues for communities. In their study on the impact of trails to adjacent property values in Indianapolis, Lindsey et al (2003) found that close proximity to a greenway generally has statistical significance or a direct link to positive effects on property values. They point out that while "the average effect on individual properties is fairly small, the total effect is substantial because so many homes are located in close proximity to greenways."

Our home State of Maryland is only beginning to realize its true potential as a cycling destination. Western Maryland has made the greatest strides to attract families, road cyclists, and mountain bikers. Home to the Great Allegheny Passage, C&O Canal, and the Western Maryland Rail Trail -- 120,000 visitors per year, one can bike for an hour or for days. The hotels, restaurants, and shops along the trails have seen increased business -- over $40 million in direct trail revenue a year just from the Great Allegheny Passage.

Improving bicycling opportunities throughout Central Maryland will attract people and employers to grow the economy. Young people are flocking to communities like Bethesda, Towson, and Baltimore's neighborhoods where they can bike to work or to transit for a commute downtown.

A survey from Portland, Oregon found that 62 percent of new residents cited the city's bike-friendliness as a factor in

their decision to move there. Businesses with biking employees benefit. Employees who commute by bicycle take fewer sick days. Sales and revenue increase when bicycle lanes are installed, even at the expense of driver convenience.

When retail sales increase, government benefits from increased tax revenue. Bethesda, Frederick, Rockville, Baltimore, and Hagerstown have all been recognized as "bronze" level Bicycle Friendly Communities. As the District of Columbia is competitively providing its residents with bicycle and pedestrian infrastructure, metro Maryland cities need to improve their walking and biking amenities to win the tax base.

Agritourism can benefit from bicycle tours organized around such activities as wine and beer tasting, dairy product consuming, fruit/vegetable shopping, even honey producer shopping, so long as there are physical bikeways and trails to safely negotiate the rural landscape.

Across the United States, communities are increasingly utilizing the "Trail Town" model to support economic revitalization by placing trail networks as one key component for tourism-centered strategy. This strategy can be particularly beneficial in small-town, rural revitalization plans. The Trail Town concept focuses on connecting adjacent or nearby trails with the community to encourage trail users to spend time and dollars in their community. The Trail Town Program in Maryland for example was an economic development initiative along the Great Allegheny Passage operated by The Progress Fund. The direct spending in the local businesses from trail users has been a major boost for the local economy in communities such as Frostburg and Cumberland. Another example is the Virginia Creeper Trail, located in southwest Virginia, which generates nearly $1.59 million in annual spending which supports approximately 27 fulltime jobs (United States Department of Agriculture, 2004). Chapter 4 describes an initiative to convert the main streets of the City of Frederick, Brunswick, Middletown, and Thurmont by a system of trails and bikeways.

The National Park Service's Rivers, Trails and Conservation Assistance Program has formed partnerships with communities in Maryland along the C&O Canal to provide technical assistance in a similar program called Canal Towns. Specific focuses of the trail and canal town programs include :

- Retain Existing Businesses
- Expand and increase revenues of existing businesses
- Recruit sustainable new Business
- Adopt Trail Town vision of revitalized trail side communities along the C&O Canal Towpath
- Integrate its concept of a visitor friendly environment into overall community planning

Beyond the tourism related economic benefits of trails is the improvement to a community's quality of life that can be an important factor in attracting and retaining businesses. Many employers, especially with a need to attract and retain millennial workers, are specifically looking to locate in communities that are walkable.

Providing Transportation Choices

A complete network of on-street bicycling would provide greater opportunities for cycling to work, school, or for shopping trips. Linkages between residential, employment, and commercial areas make cycling a viable alternative to automobile use for many of these trips. Integration with transit facilities such as MARC stations is vital.

Planning Process

The initial work involved soliciting public comments and input through several strategies. An informal ad-hoc citizen advisory committee was formed to provide direct input to staff on issues and priorities. Input from the general public was gathered through four public meetings held throughout the county and through an online survey. The online survey elicited responses from 233 people. A summary of the online survey and analysis are provided in the appendix as Exhibit #1.

As the plan moved to final completion in 2017, two outreach meetings were held – one with the Frederick City Bicycle and Pedestrian Advisory Committee (BPAC) and the other with the Frederick Bicycle Coalition, primarily focusing on: on and off street trails. A summary of these two meetings is also in the appendix as Exhibit #2.

2. Planning for Pedestrians and Cyclists

This chapter seeks to describe the broader planning concepts and design elements that may be implemented to support both walking and cycling in our communities. Many of the same planning concepts and design elements address both pedestrian and bicycle facilities so the discussion will provide a holistic view of how we should plan for and design our streets. This broader view of how our streets can accommodate multiple uses including walking, cycling, transit, and motor vehicles is called *complete streets*. The complete streets concept supports the goal of developing a balanced, multi-modal transportation system that is focused on supporting mobility for people (and goods) not just automobiles.

The importance of focusing on the mobility for people is supported by looking at the proportion of the population that cannot use an automobile due to the following circumstances:

- Age – either too young or too old to drive
- Cost – can't afford to buy/maintain a car
- Choice – the millennial age group often doesn't have cars at all or live in areas where cars are not needed for many trips.

Looking just at the age factor alone, approximately 30-40% of the county's population is either too young or too old to use a car. As the senior population continues to increase as a larger proportion of the total population the need for appropriate pedestrian facilities in particular will certainly increase. Including the lower income population and those who may choose not to drive it could be realistic to expect as much as half of the county's population not being able to use a car to get around.

Studies indicate that nationally, we make about 10 percent of all trips on foot, and over 100 million American adults walk regularly to get to work, school, run errands or visit friends. At least one-third of Americans cannot or choose not to drive and, and for most of them, being a pedestrian is an integral part of their daily life. This group includes children and young adolescents, older adults who no longer drive, people with disabilities, low-income individuals and a growing number who seek to avoid the costs of owning and maintaining a car. Other than in a few incorporated municipalities and some private developments a comprehensive pedestrian system has not been constructed in Frederick County and relatively low densities of development, limited right-of-way and costs in these areas make it difficult to retrofit the region with a robust sidewalk network.

The focus for pedestrian improvements should be on completing missing links within 2 miles of existing or proposed schools and where the type and density of existing and proposed development will support pedestrian activity i.e. designated growth areas. Although most of the existing pedestrian network resides within the municipalities, Frederick County should work to improve the existing networks within its own communities. When providing new facilities, the county should consider modifying its code to be flexible in its requirements of adjacent landowner maintenance of sidewalks. Pedestrian improvements include but are not limited to: sidewalks, shared use paths, traffic signal improvements, accessibility (ADA) related improvements, signage and/or pavement marking.

Understanding Pedestrians and Cyclists

Before delving into the planning and design concepts that would be applied to a development project or street design it is important for the planners and engineers to have some understanding of the needs and perceptions of the pedestrian and cyclist. Whether a person chooses to walk and how far that person is willing to walk is greatly influenced by perception. Walkable Communities describes several psychological principles and perceptions that planners and engineers should be aware of in the planning and design of streets. While these principles are primarily oriented to pedestrians they can also apply to how we should accommodate cyclists as well.

Security

Streets should not have hidden pockets, have too little activity, or places that are dark and isolated. Planners should avoid "dead" spaces created by vast open parking lots or blank walls that may discourage people from walking there. A feeling of security can be improved by the awareness that a pedestrian can see and be seen by homes or businesses along the street.

Comfort

This addresses both functional and visual aspects. Functional comfort considers the features of a street and sidewalk such as whether the sidewalk is wide enough (or even exists for that matter); is there separation from the street; and are there trees in a planting strip to provide shade. The visual aspects of comfort consider the view of the landscape and development along the street.

Convenience

This relates to the accessibility created by the street network. The street network should provide for multiple street connections to provide relatively short and direct routes between one's origin and destination. Blocks should be kept relatively short. Blocks longer than 500 feet create the perception of much greater distance than shorter blocks in the 300-400 foot range. A grid type street network can support this convenience.

For cyclists in particular the focus should be on accommodating the casual cyclist who would prefer to use local residential streets that have low traffic volumes and low vehicle speeds. An interconnected, grid type street network provides multiple routes for cyclists and minimizes the need for cyclists to use busier arterial roadways.

Trip Purpose

Utilitarian or nondiscretionary trips are trips that are necessary as part of a person's daily activities. These commonly include commute trips to work or school, work-related non-commute trips, shopping and errands, or taking a child to school. Depending on the length of trip and quality of bicycle facilities provided, among other factors, bicycling trips can replace or seamlessly link with other transportation modes such as transit or motor vehicle trips. In addition to people who choose to bicycle for transportation, utilitarian users may also include those who do not have access to an automobile or possess a driver's license, have no transit available, or are otherwise dependent upon bicycling.

School trips are a special type of utilitarian trip that involve younger walkers or riders and require careful attention to their characteristics. For example, elementary school children do not have fully developed peripheral vision or hearing. Children are smaller in stature which makes it harder for them to see and be seen. Many children do not know or understand the rules of the road and may not be able to perceive dangerous situations. In neighborhoods with low volume, low speed streets, older children who have been taught basic bicycling skills can share the road with automobiles. On roadways with higher speeds and volumes, bike lanes or separate pathways and safety improvements at intersections can accommodate older children with appropriate traffic skills. Planners should pay special attention to design of appropriate school crossing for pedestrians and bicyclists in neighborhoods surrounding schools.

Recreational and discretionary trips include trips made for exercise and/or leisure. Recreational users cover all age groups from children to adults to senior citizens, and will have varying levels of comfort when riding in traffic. Recreational trips can range from short trips within a neighborhood, to long rides lasting several hours and covering many miles. Children will generally ride within their neighborhood, with friends or parents, and on streets, sidewalks, or shared-use paths. Adult recreational trips cover a wide range depending on the user's comfort and fitness level, with average adult users looking for moderate to slow-paced riding on quiet streets or shared use paths. A smaller number of adult bicyclists go on long-distance recreational trips, seeking out scenic and sometimes challenging terrain for sport and fitness.

Mountain bicyclists fall into the category of recreational riders but are considered a unique and independent group due to their regular use of natural surfaces in addition to paved surfaces. Mountain bikes are generally designed for use on both types of surfaces.

Utilitarian vs. Recreation

The line between utilitarian and recreational bicycling is blurry at best because the same transportation system can be used for both purposes. Just as roads are designed for various motor vehicle trip purposes, roads and pathways should be designed to facilitate various bicycle trip purposes and there is very little difference between a bicycle network that is intended for recreational bicyclists versus one that is designed for transportation trips.

People who use a bike for transportation get exercise they may not have otherwise had time for, or that would have

required additional time and expense, such as going to a fitness center. Unlike driving, which is typically not viewed as a recreational activity but rather as a means to an end, many people choose to bicycle because it achieves more than a single purpose, such as exercising while reaching a destination. Bicycling is a multifaceted recreational activity for millions of people nationwide, young and old, cutting across many socioeconomic and demographic categories. Some users may never go beyond riding on a shared use path or low volume roads, while others may advance their skills and become bicycle commuters. That is why understanding and planning for the needs and abilities of all bicycle users is necessary to design successful bicycle networks.

The descriptions below provide a general idea of typical differences between trip types, however it should be noted that some trips combine purposes and do not fall into these distinct categories:

1. Recreational Trips Description
Directness of route not as important as visual interest, shade, protection from wind.
Directness of route and connected, continuous facilities more important than visual interest, etc.
Loop trips may be preferred to backtracking; start and end points are often the same.
Trips may range from under a mile to over 50 miles Trips generally are 1-5 miles in length
Short-term bicycle parking is needed at recreational sites, parks, trailheads and other recreational activity centers,
Varied topography may be desired, depending on the fitness and skill level of the bicyclist

2. Utilitarian Trips Description
Short-term and long-term bicycle parking is needed at stores, transit stations, schools, workplaces. Flat topography is desired.
May be riding in a group. Often ride alone.
May drive with their bicycles to the starting point of a ride Use bicycle as primary transportation mode for the trip; may transfer to public transportation; may or may not have access to a car for the trip.
Typically occur on the weekend or on weekdays before morning commute hours or after evening commute hours.
Some trips occur during morning and evening commute hours (commute to school and work), but in general bicycle commute trips may occur at any hour of the day.

Rider Age

Adults do not have uniform cognitive and perceptual abilities. However, in comparison to children (generally 12 years of age and under) adults generally can start and stop movement of their bicycle more quickly, are more visible to motorists, can interpret directionality of sounds with greater accuracy, and have a greater awareness of potential conflicts. In addition, most adults also operate motor vehicles and have the advantage of understanding the "rules of the road" as motorists; therefore, they are already familiar with riding in traffic.

Seniors are a special type of adult rider who may ride at a slower pace and have longer reaction times when faced with sudden hazards. Children have a wide range of skills and cognitive capabilities. Generally, children are slower in recognizing and responding to rapidly changing situations. This leads to possible dangers in common situations that children face when riding bicycles, such as crossing streets. Children tend to:

- Have a relatively narrow field of vision.
- Have difficulties accurately judging speed and distance of an approaching vehicle.
- Assume a vehicle can see them if they can see the vehicle.
- Have difficulty concentrating on more than one thing.
- Have difficulty understanding danger.
- Have difficulty determining the direction of auditory input.

- Have little experience with the rules of the road because they do not drive motor vehicles.

Safety

Nationwide, bicyclist fatalities had been declining steadily, hitting an all-time low of 621 in 2010. Since then, however, the trend line has been moving in the wrong direction; in 2015, 818 bicyclists were killed on U.S. roadways, a 12.2% increase over the previous year and the largest uptick in two decades. Bicyclists have consistently accounted for at least 2 percent of all roadway fatalities. Adults rather than children are now more likely to die in a bicyclist-motor vehicle crash. Today, adults account for 88 percent of bicyclist fatalities, with the average age being 45. Male bicyclists are almost six times more likely to be killed than female cyclists, a finding that has remained unchanged since 1975. As to where and when these fatal bicyclist-motor vehicles crashes are occurring, 70 percent take place in urban settings and 72 percent at locations that are not at an intersection. While these crashes are fairly evenly distributed between daylight and darkness (47 percent each), the fact that 80 percent of cycling trips take place during daylight hours points to the increased risk for riding at night.

Bicycle-motor vehicle crashes are often the result of the motorist failing to notice the bicyclist. Riders, on the other hand, are more likely to see the vehicle and expect the driver to give way. When they do not, bicyclists often cannot stop in time to avoid a crash. Attentiveness is critical for safely sharing the road. A smaller number of bicyclists also admit to being distracted, with approximately 9 percent reporting the use of a cell phone or other mobile device on nearly all of their cycling trips. Alcohol is also a factor for both bicyclists and drivers involved in bicycle-motor vehicle fatal crashes. Data also reveals that 54 percent of the bicyclists killed in 2015 were not wearing a helmet, a proven countermeasure for preventing serious and fatal head injuries for cyclists of all ages in the event of a crash or fall.

Taking a three "E" approach – engineering, education and enforcement – is needed to make gains in bicyclist safety. While infrastructure improvements (engineering) are key, behavioral-related initiatives (education and enforcement) must work in tandem with the built-environment to ensure the safety not only of bicyclists, but all roadway users. From the education perspective, school children from primary elementary to secondary school, presumably as part of the physical education curriculum, need theoretical and practical training in bike riding and safe pedestrian movements. School curriculum writers are encouraged to review current plans and update to current standards as necessary.

In Frederick County, arguably the most dangerous movement is that which attempts to cross US 15 north of the City of Frederick. This is especially true during the peak weekday and weekend traffic periods which can extend for hours each day. The challenge is further exacerbated by the high speeds of travel where even the average speed far exceeds the posted 55 mph limit. A combination of better enforcement and signing (especially at designated bikeways) should be established to help make the crossings more friendly for non-motorized use.

Bicycle and Pedestrian Demand

Designated School Walking Areas

There are a number of public schools in Frederick County that have designated walking areas around their schools. These walking areas are defined by Frederick County Public Schools (FCPS) in Policy 441: Transportation of Students. Highlights of this policy are as follows:

Parents are responsible for overseeing students as they walk to school or transporting them if the students' most practical, direct walking route to school is:

- 1.25 miles or less for grades pre-K through 5 (except at primary schools), or
- 1.75 miles or less for grades 6-12.

The Superintendent has authority to allow exceptions in order to avoid unsafe walking conditions for students. FCPS provides transportation to students who do not have a suitable walkway, have to cross a railroad, do not have safe crossings, or face some other hazard identified by the Director of Transportation. Parents of students enrolled in a school outside the attendance area (out of district) are responsible for transporting their children. The FCPS provides bus transportation for about 30,000 students every school day. For school bus riders, walking distance to the bus stop is no more than 0.5 mile. Students designated as

walkers by school are noted above. These students are not provided bus transportation. It should be noted that on any given day some students that are designated as walkers may actually be transported by private vehicle just as some students that are just outside the designated walking area may actually walk. Assessment of walking and biking conditions around these schools should not focus solely on the officially designated walking area.

Biking, Walking & Transit

A significant number of transit riders in Frederick County access the various transit services by walking or bicycling, and as a result, funding emphasis should be placed on making sure pedestrian access to those stops are safe and efficient. Some of these riders choose walking or bicycling over park and ride while others do not have access to vehicles. While Commuter Bus and MARC Rail service only provides space on board for folding bicycles, each regional transit stop provides bicycle parking to meet existing demand. For local TransIT service, bicycle on-bus boarding continues healthy growth. Paratransit ridership should be monitored for locations where pedestrians are accessing paratransit service only because of access limitations to regular connector or shuttle service. Figure 2.1 shows the locations of transit service and typical walking areas around the stations.

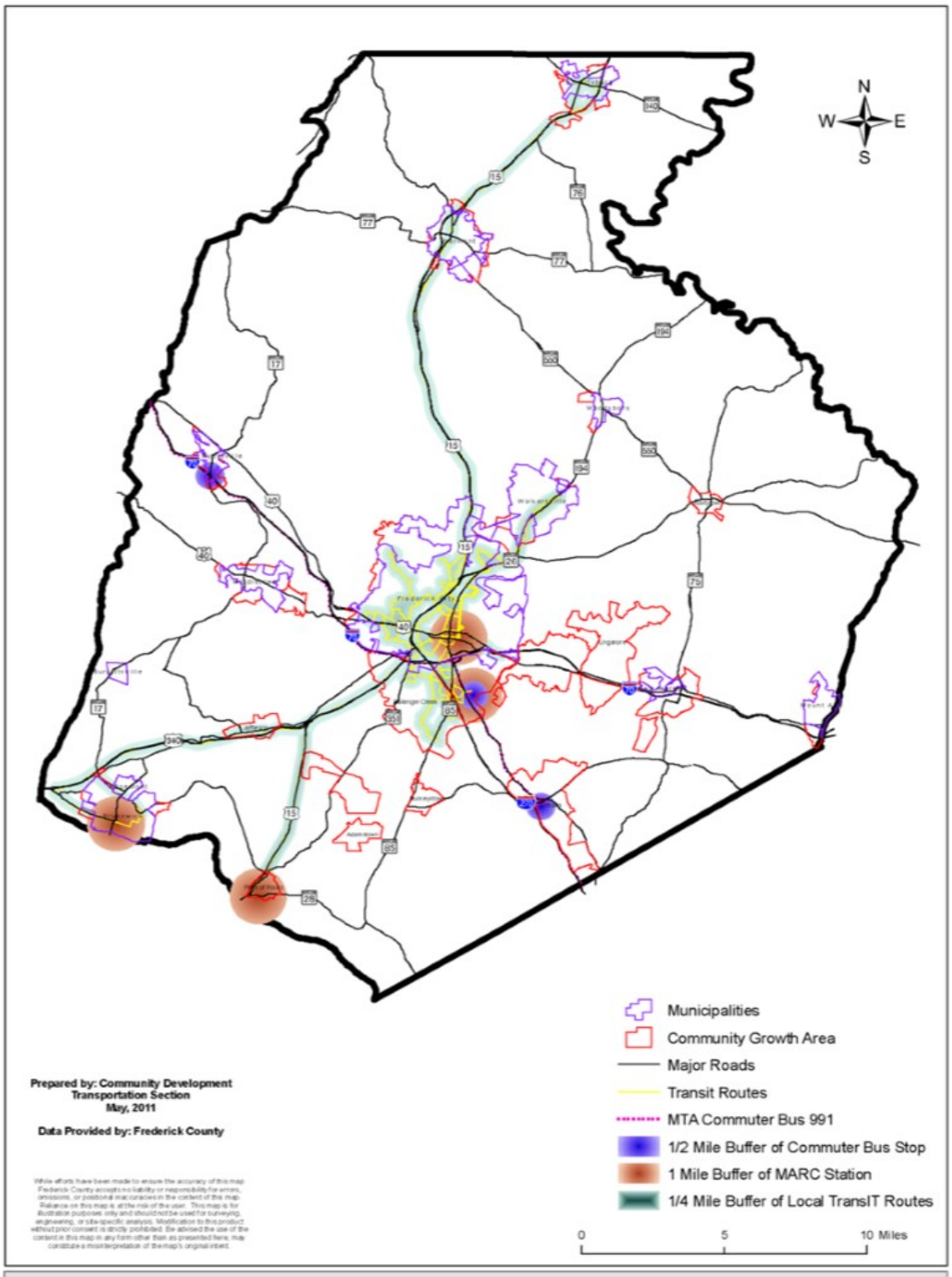
Another way of measuring existing and future walkability and bikeability of a community is by using street connectivity. Areas with high levels of street connections, like urban areas with a grid street network and small block lengths (300-400 feet) would have high levels of walkability and bikeability. Areas with few street connections, like suburban areas with cul-de-sacs and long blocks (500-750 feet) would rate low for walking and cycling access. For the purposes of this plan, the primary measurement of connectivity involved a measurement of the number of street intersections in a defined area. As illustrated in Figure 2.2, high intersection density is equated with high levels of street connectivity while low intersection densities are equated with fewer street connections. A GIS analysis of intersection points included total number of intersection points (minus intersections with Freeways and Interstates) divided by acres in each Transportation Analysis Zone (TAZ).

The addition of thru bicycle and pedestrian facilities at cul-de-sac locations or through open space parcels and those intersections with the roadway network would add slightly to the connectivity values. Density of the transportation network itself also could be valuable in determining overall connectivity. Finally, it should be noted that a comprehensive (and very data intensive) analysis of connectivity would take into account the bicycle and pedestrian facilities adjacent to the roadways since a roadway without shoulder, parallel path and/or sidewalk should not have the same connectivity weighting as a roadway with those facilities.

Bicycle & Pedestrian Demand Mapping

In addition to existing bicycle and pedestrian volumes, it is important to recognize the latent demand for bicycling and walking and attraction of various land uses. These specific land use types that drive demand include: schools and universities, grocery stores, retail centers, parks, employment locations (especially large employers), rail stations and bus stops. Figure 2.3 shows the density of the land use areas with higher bicycle and pedestrian demand. The higher the density of these types of land uses, the higher the need to provide safe and appropriate walking and biking facilities.

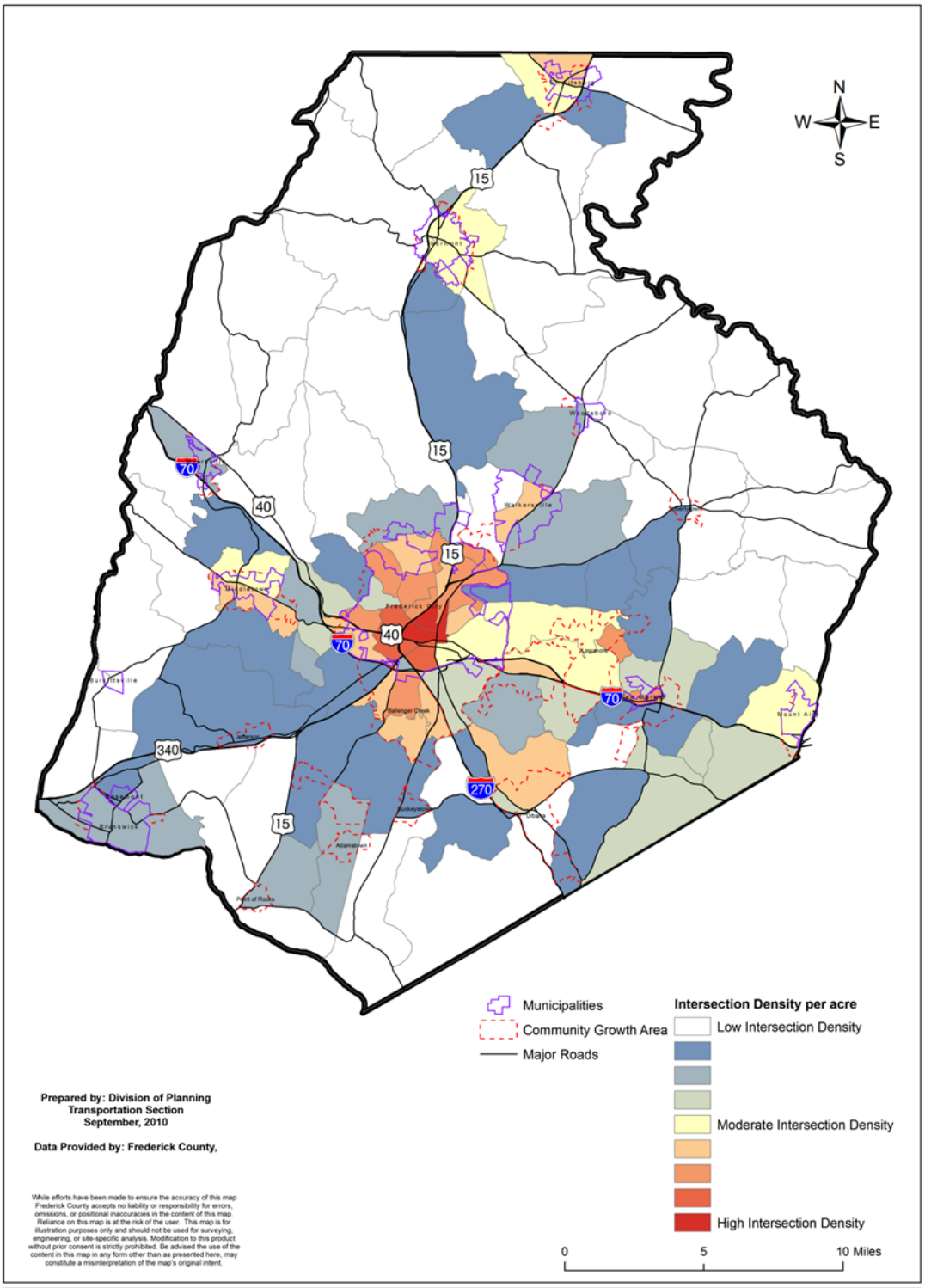
Figure 2.1



Access to Transit by Walking Distance

Frederick County, Maryland

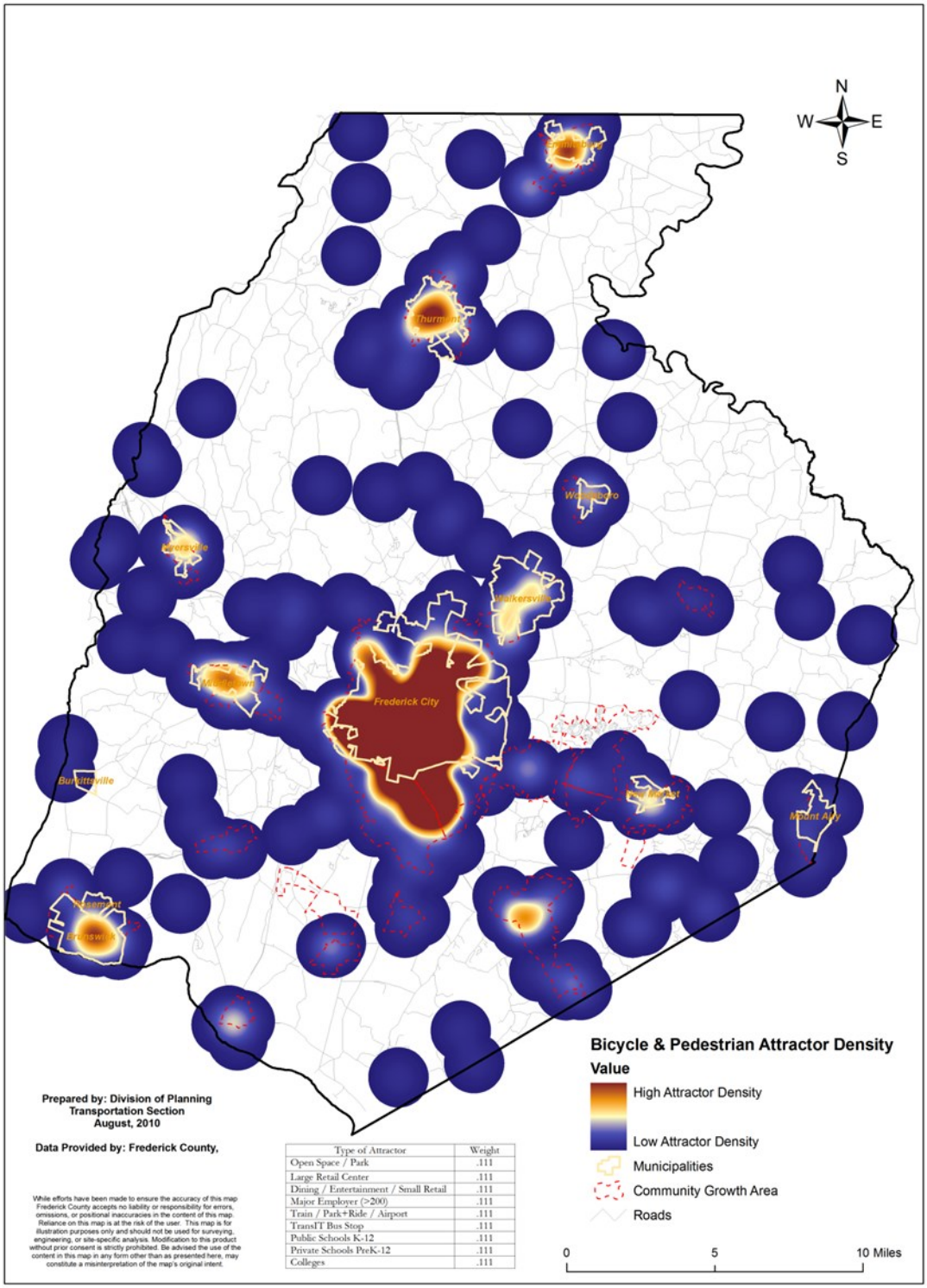
Figure 2.2



Intersection Density per Acre by Transportation Analysis Zone

Frederick County, Maryland

Figure 2.3



Bicycle & Pedestrian Attractor Density

Frederick County, Maryland

Planning and Design Principles

The following planning and design principles support both walking and cycling in the community. Some of the principles are broader in nature than would be referenced in a comprehensive plan. Others provide more detail that has greater application at the development review stage for a subdivision or site plan. The primary take away regarding these principles is to plan and design for the big picture and the entire community.

Mixed Land Uses

Land use and the need to promote higher density, compact developments which have mixed uses in close proximity to one another is a critical factor in facilitating more walking and cycling. For a mixed use development to be truly walkable the principles related to street and sidewalk connectivity must also be present. Related to the concept of mixed uses is the design of such developments to create active streets and there for attractive to pedestrians. These design elements include moving the buildings close to the sidewalk, having wide sidewalks (8-10 feet or more), allowing for on-street parking, providing street trees, and providing for safe intersection crossings. All of these elements seek to create that "Main Street" environment.

Facility Siting

Community facilities including schools, parks, libraries, and other facilities require a significant public investment to construct and maintain. Given that many facilities will continue to serve our communities for several generations it is critical that they be located to effectively serve both current and future residents. It is also important to understand the role facilities such as schools and libraries play in creating a civic focal point and an identity for our communities. The following principles are meant to provide guidance in locating facilities to maximize the efficient use of public funding and to support their long term use in the community.

- Community facilities should be located within Community Growth Areas where infrastructure is available (water and sewer facilities, roads, sidewalks, and public transit).
- Focus community facilities with other activities such as commercial areas and in the physical center of the community where the buildings themselves can help to establish a civic and community identity.
- Community facilities should be located within Community Growth Areas where the greatest population is concentrated to maximize pedestrian, bicycle, and transit access to the facilities.
- Community facilities should support the joint use of buildings and sites to consolidate services and better serve the surrounding community.
- Development proposals should incorporate into their plans and contribute to the construction of community facilities as identified in County Plans.

Plan All Streets

The street network within a particular development and its relationship to the larger community is a critical factor in making a community accessible for both the pedestrian and the motorist. We need to focus on neighborhood connectivity through the site plan or subdivision process, to establish the local street network.

Comprehensive plans should identify a conceptual network of local streets to show connections between properties and with the collector and arterial roads. The plan maps should be backed up with goal and policy statements which address the desire to have local and collector street connections within and between developments.

Establish More Realistic Functional Classification of Streets

At the comprehensive plan level there needs to be a more realistic designation of functional classification of existing and new roadways. In many cases, new roads are designated and constructed at standards that result in streets that are too wide for the amount of traffic that is expected and are inconsistent with the scale of the adjoining neighborhoods. The most common error is designating too many streets as arterials when they will actually function as collectors.

Develop a Connected Street Network

While a true grid street network typical of older urban, downtown areas provide an ideal connected network, it is not always possible or desirable to apply in new developments. A well connected street network has many short links, numerous intersections, and few if any cul-de-sacs. As connectivity increases, travel times and distances (whether walking or driving) decrease and route options increase. Many of our small towns were originally developed with grid street networks to varying degrees which should be continued into new development.

A grid network provides multiple travel paths for pedestrians, cyclists and automobiles which can shorten trip lengths and provide greater convenience and accessibility. Grid networks are generally considered to have a greater traffic carrying capacity than the typical network where all the development in an area feeds into a centrally located arterial highway. Having two parallel two-lane roads will have greater capacity than one four-lane road.

By spreading out traffic throughout a broader network, roads and intersections can be kept narrower and more in scale with residential neighborhoods and will also be safer for pedestrians and cyclists to navigate.

A grid network also provides a more equitable distribution of traffic versus the cul-de-sac network where the few through streets have to handle a much higher proportion of the traffic in a development versus cul-de-sacs which only need to handle traffic from homes located on that street. This is why residents are so opposed to having through streets. A grid network keeps any one street from having to carry most of the traffic in a neighborhood.

Grids create more humanly scaled blocks which reduces the perception of distance for pedestrians. Blocks should be 300-500 ft. in length.

Safety Action Plan

Before matching solutions to identified problems, we need to understand the range of initiatives and project types available to improve safety. Collaborative and multidisciplinary approaches would help leverage a wide range of resources in response to pedestrian and bicyclist safety problems. Rather than focusing on a specific intersection or corridor, a policy would influence safety throughout the entire transportation system. Policy recommendations can provide excellent opportunities for addressing road safety and establishing a foundation for more targeted interventions and programs, such as:

- Vision Zero Policies: this represents a dramatic shift from a traditional to a safe system approach to road safety, these are often referred to as Toward Zero Deaths policies - a high-level and broadly supported commitment to eliminating all road fatalities.
- Complete Streets Policies: requiring transportation decisions to be made with all road users in mind.
- Land Use, Parking, and Site Design Policies: this can set the stage for future development that is supportive of pedestrian and bicyclist safety, such as parking policies that dictate the placement of parking lots behind developments, ordinances that support and incentivize mixed-use development, connectivity policies that reduce block lengths, etc.
- Maintaining Connectivity through Work Zones: policies can require that steps are taken to prioritize the safe movement of pedestrians, bicyclists, and individuals with disabilities around or through work sites without forcing them into the roadway.
- Minimum Passing Distance Laws: laws requiring that motor vehicles passing bicyclists maintain a minimum passing distance, typically between three and five feet, such laws provide a basis for law enforcement agencies to conduct enforcement operations that target this high-risk behavior.
- Freight and Delivery Policies: this can shift delivery times and locations to minimize risk to non-motorized road users.
- Speed Limits: while speed management requires a more comprehensive strategy, one critical step is setting an appropriate speed limit for any given road; law enforcement and transportation agencies can more appropriately deploy programs and countermeasures that reinforce safe speeds.
- Use of Automated Enforcement Technologies: tools such as red-light cameras and automated speed enforcement can improve safety for all road users

The optimal way to accomplish these policies is through a

safety action plan. The safety action plan presents an opportunity for agencies to adopt specific designs into routine use at all locations. By developing and adopting a design manual that features these strategies, future transportation projects will result in streets and intersections that reflect our safety goals.

Countermeasures and roadway design strategies are organized into the following location types:

- Along the Road: facilities that provide comfortable and safe travel; for pedestrians these include primarily sidewalks, which should be provided on both sides of the road, but in more rural settings may be sufficient to provide a wide paved shoulder; for bicyclists these include for low volume/low speed streets and shared lane facilities, but as speeds and volumes increase, bicyclists require options that provide strategies to narrow lanes, eliminate lanes, or provide medians
- Crossing Locations: the unique needs of pedestrians and bicyclists are most apparent at intersection locations where safety improvements for one road user cannot always solve problems for the other. Design principles at crossing locations should help reduce crossing distances and exposure to motor vehicles while also minimizing conflicts between modes that can often result from turning movements. Reducing curb radii, improving sight distance, and enhancing signs, signals, and markings can address these concerns and make complex intersections more manageable for all road users.
- Traffic Calming: solutions help reduce traffic speeds and volumes to enhance the safety of pedestrians and bicyclists. Deploying countermeasures like mini traffic circles, speed humps or tables, and landscaping can improve safety and comfort for pedestrians while also creating low stress routes for bicyclists.
- Shared Use Facilities: paths and trails provide pedestrians and bicyclists with the maximum amount of separation from motor vehicle traffic and can serve to connect destinations where on-road facilities do not exist. Shared use paths and trails should be designed with both pedestrians and bicyclists in mind, with clear etiquette established on priority for right of way. Locations where trails cross roadways should be prioritized for safety improvements.
- Lighting to provide visibility and conspicuity: pedestrian-scale lighting provides much-needed illumination that overhead corridor lighting often does not provide. Improving lighting along roads, at intersections, and along trails can provide both safety and personal security benefits.

Types of Crosswalk Marking

Varying crossing treatments can be applied to different situations based on existing conditions and engineering judgement.

- Parallel Lines with transverse markings.
  -Appropriate Locations: not recommended, research has shown issues with visibility and long-term maintenance regardless of type of application.
- Parallel Lines with perpendicular cross markings (ladder style)
  -Appropriate Locations: school zone crossings
- Perpendicular cross markings (piano keys) with no parallel lines (not permitted on State roadways)
  -Appropriate Locations: high volume pedestrian crossings
- Painted vs. Thermoplastic Marking. While thermoplastic markings may cost more for installation than paint, there are benefits to their application including lower maintenance cost and better retro reflectivity.

Use MUTCD and line marking guidance above and install pedestrian countdown signals wherever there are crosswalks along with signalized intersections.

Mid-block Crossings

Occasionally, mid-block crossings (crossings not at intersections) may be an appropriate treatment where demand is high, safe alternatives are not available and/or sight distance is adequate. The checklist that follows on the next page should be reviewed to determine the appropriateness of adding, improving or removing a mid-block crossing.

Transit Friendly Design

To maximize the use of public transportation in the Frederick County community, it is important to address land use and the design of new development to provide a greater

physical orientation to likely transit routes and stops. The County has developed Transit Friendly Design Guidelines, which seek to integrate land use, zoning, and transportation planning elements to promote higher density, mixed use development that is easily accessible and designed for various modes of transportation. In addition to transit

Mid-Block Crosswalk Evaluation Checklist	
Location	Accessible detour if crosswalk removed
Maintained by	Non-accessible detour if crosswalk removed
If existing, why was the mid-block crossing installed?	Non-accessible detour issue
AADT (Average Annual Daily Traffic).	Is there any Pedestrian crash history within 0.25 miles within last four years?
Posted Speed	Estimated daily pedestrian volume if available:
Number of Lanes	Is there a school within 0.5 Mile?
Number of Signalized intersections within 750	Are the correct MUTCD signs used
Do these intersections have marked crosswalks of road in question?	Existing pavement markings
Do these intersections have pedestrian signals?	Has sight distance adequacy been assessed?
Does the mid-block crossing have a median?	Existing Pedestrian Counts (within 1.0 mile) if available
If a median is present, is it ADA accessible?	Existing & Proposed Land Uses
ADA Issues	

friendly design, other opportunities for integrating bicycling and transit can enhance the transportation network including: sharing information on transporting your bicycle on local transit, promoting "park and bike" opportunities at park and ride lots, promoting and developing bicycle sharing programs.

Pedestrian Comfort

Provide a comfortable pedestrian environment, particularly along heavily traveled streets and arterials. Provide grass planting strips, at least 3 feet wide, between the sidewalk and the street to buffer pedestrians from the traffic. These buffers also provide space for snow storage during the winter and for street trees to provide shade during the summer.

Safe Routes to School

One of the key ways to improve the safety, health and transportation issues for Frederick County residents is by focusing on providing safe options for school children to walk or bicycle to school. The provision of and improvement of safe school walking and biking routes should be included in all of the following transportation and land use planning processes: school siting; internal and external school transportation access; county, state and municipal capital improvement programs; developer funded transportation improvements; available grant funded programs and school bus transportation planning.

Benefits of a safe routes to schools program include: improved walking and bicycling conditions; increased physical activity; decreased congestion and air pollution around schools; and it can lead to cost savings for schools (reduce need for "hazard" busing).

A complete program includes the following elements:

- Engineering: The provision of sidewalks, shared use paths, crossing improvements, on-street bicycle facilities, signage and pavement markings.
- Enforcement: School zone speed enforcement, crossing enforcement and parking enforcement
- Education: Bicycle and pedestrian safety skills education, health education, incorporation into Frederick Co. approved curriculum objectives
- Encouragement: Incentives for walking and bicycling; special events; overcoming safety concerns through parent, staff and community support and supervised walking and bicycling.

- Evaluation: goal setting and program adjustments as needed.

Drainage Grates and Rumble Strips

Drainage grates with openings running parallel to the curb can cause narrow bicycle wheels to drop into the gaps and cause a severe crash. Care must be taken to ensure drainage grates are bicycle-safe, with openings small enough to prevent a bicycle wheel from falling into the slots of the grate. Bicycle compatible grates should be used. When repaving or maintaining roadways, drainage grates should be inspected to ensure that grate patterns are perpendicular to the road. Replacement of bicycle-unfriendly drainage grates should be a standard operating procedure.

Another way to avoid drainage-grate problems is to eliminate them entirely with the use of inlets in the curb face. This may require more inlets per mile to handle bypass flow. Another bicycle-friendly option is to ensure the inlet grate is entirely contained in the gutter of the street, rather than extending it out into the traveled way.

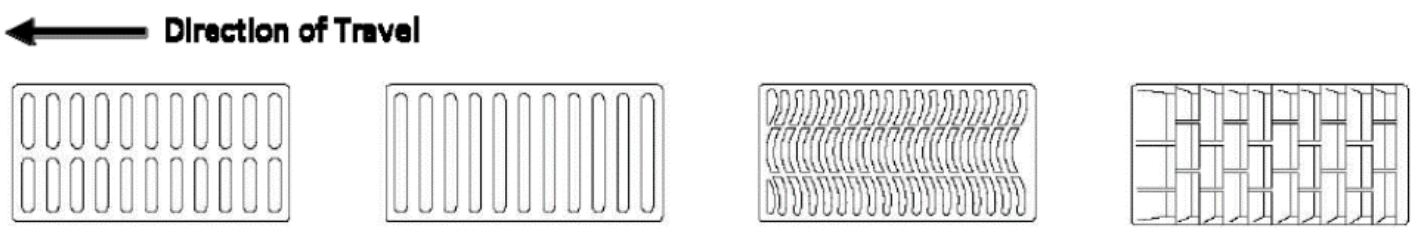
Where bicycle-incompatible grates remain, metal straps can be welded across slots perpendicular to the direction of travel at a maximum longitudinal spacing of 4 inches (although care must be taken to ensure that the grate does not become a debris collection site. These should be checked periodically to ensure that the straps remain in place. In general, this is only a temporary solution and the location should ultimately be retrofitted with bicycle-compatible drainage grates.

Another problem arises when the roadway surface sinks, crumbles, or becomes otherwise un-rideable around the catch basin area. Surface grates should be flush with the road surface. Inlets should be raised after a pavement overlay to within 1/4 inch of the new surface. If this is not possible or practical, the pavement must taper into drainage inlets so it does not have an abrupt edge at the inlet. Utility covers present similar problems and should be installed flush with the adjacent roadway surface.

When rumble strips are considered along roadways in Frederick County, it is possible to design so that these meet the intent of the safety treatment while not adding potentially unsafe conditions to cyclist. In general, allowing short gaps for cyclists to bypass the rumble strips, while maintaining the efficacy of the treatment is an appropriate design.

Snow Removal

On-street bikeways should be plowed and maintained after snowstorms. Prompt and effective snow clearance on sidewalks is critical to maintaining safe walking conditions. If walkways, crosswalks, islands, and curb ramps are icy or un-shoveled, travel is both difficult and dangerous for pedestrians. Children, the elderly and people with disabilities are most affected. Although there are challenges with enforcement, it is critical that the county enforce our regulations to encourage walking and increase pedestrian safety. Depending upon location, snow and ice removal are generally the responsibility of the county, homeowner's association or private abutters (e.g., homes, businesses, property owners or tenants) as stated in Exhibit #3 in the Appendix.



Bicycle parking and Amenities

The provision of secure and convenient bicycle parking is an important part of providing the option for Frederick County residents to consider the use of their bicycles for a wide array of daily trips. Adopted in January, 2010 (included in the appendix as Exhibit #4), the Frederick County Bicycle Parking Design Guide is meant to supplement the bicycle parking requirements set forth in the Frederick County Zoning Ordinance and are configured to be flexible in nature to accommodate the unique or unusual aspects of specific sites. The Guide addresses the following best practices:

- Provide suitable, short-term bicycle parking where cyclists stop.
- Locate bicycle parking where it is convenient to use, secure, visible, and protected from weather.
- Provide long-term bicycle parking for commuters, residents or anywhere else cyclists will leave a bicycle for several hours or overnight.

There are a variety of alternative bicycle parking concepts that could be applied in Frederick County depending upon demand. Those concepts most likely viable in suburban and exurban settings include custom-designed racks and on-street bicycle parking. Other options such as attended bicycle parking and bicycle sharing are more conducive to the City of Frederick. While alternative bicycle parking concepts are encouraged, individual applications must receive approval from the planning commission and meet all other applicable local codes and regulations.

Custom Designs. Custom-designed bicycle racks include basic 'inverted-u' or hitching post style racks with sponsor names, logos or artistic designs. All custom racks are still required to include the basic support, locking, and installation elements. Custom designs can have the secondary benefit of reflecting neighborhood identity or business distourism themes and may indeed build upon other economic development or community revitalization efforts.

On-street Bicycle Parking. On-street bicycle parking replaces an auto parking space and fills it with bicycle racks. These projects can be very popular with bicyclists, pedestrians and merchants alike. In places with narrow sidewalks and many bicyclists, it frees up the sidewalk for pedestrians and adds space for accessibility while also accommodating parked bikes.

Resources. The county currently abides by the 2011 Maryland Manual on Uniform Traffic Control Devices (MUTCD) where practical and uses the 2013 MDOT Bicycle Policy and Design Guidelines as a design guide.

The Complete Street

While the function and design of streets continues to evolve in a direction to create more livable communities, there remains a lack of understanding, and not just by engineers, about the role of streets in our communities. In the book, *A Better Place to Live*, Philip Langdon describes the role of streets in our communities.

> Streets and roads mold a community's character. They enliven daily life or deaden it. They foster human contact or frustrate it. They broaden people's choices or limit them to a narrow range of experiences.
>
> The main elements needed for better communities are clear. There should be a generously connected network of streets and sidewalks network that allows pedestrians, bicyclists, and motorists to move over many different routes, enjoying and learning from, not just tolerating, their surroundings. Streets should be conceived as outdoor "public rooms" that people will relish occupying _places pleasingly enclosed by the front of the buildings and other agreeable elements such as trees, hedges, and low fences. Garages should be relegated to rear alleys or to other inconspicuous locations so that the houses can display more engaging features their entrances, windows, porches, architectural detailing, and landscaping. It is these elements that dignify the street and give it a congenial atmosphere.

Formalizing this view of how our streets function took root in 2003 when the complete streets term was used to establish a policy and the concept. The complete concept is defined as:

> A complete streets policy ensures that the entire right of way is routinely designed and operated to enable safe access for all users. Pedestrian, bicyclists, motorist and transit riders of all ages and abilities must be able to safely move along and across a complete street.

The County Comprehensive Plan, adopted in 2010, references the Complete Streets policy. The Comprehensive Plan also includes an action item recommending the preparation and adoption of guidelines and ordinances to implement the complete streets policy.

Design Principles and Guidelines

Described here are general design guidelines that can be further implemented in more detailed design manuals. The guidelines are described under the three primary components of a complete street, the street, the sidewalk, and the intersection.

The Street

- Reduce Street Widths – What is commonly referred to as the road diet entails reducing the number of lanes on an existing street and/or reducing the travel lane widths. Especially for collector type roads and even some arterials one travel lane in each direction can often accommodate daily traffic volumes. The excess pavement area can then be converted to bicycle lanes and/or on-street parking. Lane widths should be kept to a maximum of 11 feet and can be as little as 9 feet for low volume turn lanes) and still safely accommodate trucks.
- Calm Traffic Speeds – Vehicle speeds affect the safety of both motorists and pedestrians and cyclists with the higher speeds contributing to less safe environment. High vehicle speeds are a function of having unnecessarily wide streets and wide travel lanes. Though even narrow streets without on-street parking can also have high vehicle speeds. Reducing street/lane widths, providing on-street parking, using curb extensions at intersections, and having street trees can all help to moderate vehicle speeds. Other features such as pedestrian medians and using roundabouts instead of signalized intersections also help.

The Sidewalk

- Wide Sidewalks – The minimum sidewalk width should be 5 feet not the more typical standard of 4 feet, in order to meet the intent of ADA objectives as well as provide a more safe and comfortable walking environment. As the surrounding land use intensity increases and in urban settings the sidewalks should be wider especially to fill the entire space between the street and the building fronts. In non-urban settings where a grass strip between the sidewalk and curb is provided the strip should be a minimum of 3 feet and wider along arterials with high vehicle speeds. To accommo-

date street trees a grass strip of 5-6 feet in width is recommended.

- Barrier Free – Sidewalks should not be used to locate street signs, utility poles, or signal control boxes. Pedestrians with or without a disability should not have to contend with any more barriers then they may already face in navigating our streets. Providing a grass strip between the sidewalk and the curb provides for snow storage, a safer clear zone for pedestrians and keeps car doors from opening into and blocking the sidewalk.
- Plant Street Trees – Shade trees provide several benefits including shading the sidewalk thereby improving pedestrian comfort, buffering the street especially on busy, high speed streets, helping to calm vehicle speeds.

The Intersection

- Compact Intersections – Compact intersections can provide a significantly safer condition for pedestrians, cyclists, and motorists. The intersection design is a function of the number of lanes, lane widths, and the corner radii. Minimizing all of these has the effect of shortening the crossing distance for pedestrians, providing better visibility of pedestrians and cyclists, and helping to calm vehicle speeds especially for turning vehicles. Avoid allowing free right-turn movements or at the least design them to slow down the turning vehicle and have better visibility of the crosswalk.
- Curb Extensions – These are probably the most effective means to create a compact intersection and reduce the crossing width for pedestrians. Typically they are used where there is on-street parking in urban settings though they can also be used where there is a paved shoulder area in a more suburban or rural setting.
- Crosswalks – Some type of marked crosswalk should be provided along practically all collector and arterial roads in urban settings. In lower density areas they may be focused on intersections with heavier pedestrian activity. On heavily traveled roads with high pedestrian use pedestrian signals that can be actuated by the pedestrian should be provided.
- Median Treatments – Multi-lane roads with medians should have the median extend all the way through the crosswalk, with an ADA required minimum 6 foot long cut-through for the crosswalk, to provide a pedestrian refuge. Medians can also be used with two-lane roadways to calm vehicle speeds.
- Minimize acceleration/deceleration lanes – For all but arterial type highways and especially in more urban environments, accel/decel lanes should be minimized as they contribute to higher vehicle speeds. They also add crossing distance for pedestrians.

Implementing Complete Street

The implementation of a complete streets policy will need to occur at several levels. Beyond its introduction in this Plan is its reference in the County Comprehensive Plan. While the concept is described in the 2010 Comprehensive Plan there is not a formal reference as a policy statement to establish its standing. In many communities, such as the City of Frederick, the adoption of a complete streets policy is considered as a stand-alone, formal decision by the elected officials, which in turn provides direction to the jurisdiction's implementing agencies.

Beyond the general references of the concept and policy is the need to integrate specific design standards/guidelines for streets, pedestrian facilities, and bicycle facilities into the County's Streets & Roads Design Manual. Further, at least a reference if not the incorporation of complete streets design elements in ordinances and regulations that would provide the greatest degree of leverage to incorporate into development plans and street designs. Finally, the concept needs to be implemented on both road rehabilitation projects and on-going sidewalk and shoulder retrofit projects. A proposed draft complete streets policy is in the appendix as Exhibit #3.

3. On-Street Bikeway Network

Planning Concepts

A network of on-street bikeways will serve multiple purposes including recreational cycling, commuting to work, or riding to the store or to school. The designated bikeways will connect existing and proposed growth areas as well as parks and recreation areas. Designation of the roads for on-street bikeways does not imply that these roads currently meet the design standards described in this Plan. The primary focus for identifying a bikeway network is to identify roads for appropriate bikeway improvements. These and other plan concept elements for on-street bikeways are described below.

Provide a Countywide Network

It is not the intent of this Plan to designate every road that is used by bicyclists. Rather this Plan proposes a network that links Frederick City and municipalities along major corridors in a hub and spoke network through the County. At a countywide scale such a network would be primarily oriented to recreational trips versus transportation/commuting trips. The spokes are also linked together to provide cross county connections. This network will provide countywide access on improved bikeway facilities for cyclists who can then gain access onto other roads that because of low traffic volumes and speeds are comfortable for cycling but do not necessarily need to be improved with bicycle facilities. Every municipality within the County is connected with a designated bikeway.

Serve Transportation and Recreational Trips

The bikeway connections between and within the County's growth areas will help to accommodate those who could commute to work on their bicycle. In this context the network should provide connections between residential areas and nearby employment areas. The on-street bikeways will also help to facilitate other transportation trips for shopping, visiting friends, or running errands. The bikeways will also serve cyclists on recreational trips whether the trip itself is for touring the County or to access a park. The recreational focus for a bikeway network also supports a broader tourism effort that can attract visitors to the County just for the cycling opportunities.

Provide Regional Connections

The proposed network will provide bikeway connections to all adjoining counties and incorporates all the MDOT bike routes (now in the process of updating to a statewide bike "spine network"). This will provide continuity across the state as other counties adopt designated bike routes.

Accommodate all types of Cyclists

Improvements to the designated roads will help to accommodate both advanced cyclists and basic cyclists. Basic cyclists will require bike lane improvements while advanced cyclists would be able to use any of the improvements proposed for on-street bikeway design standards.

Level of User Skill and Comfort

Experienced and Confident

This group includes bicyclists who are comfortable riding on most types of bicycle facilities. This group also includes utilitarian and recreational riders of many ages who are confident enough to ride on busy roads and navigate in traffic when necessary to reach their destination. However, some may prefer to travel on low-traffic residential streets or shared-use paths. Such bicyclists may deviate from the most direct route to travel in their preferred riding conditions. Experienced bicyclists may include commuters, long-distance road bicyclists, racers, and those who regularly participate in rides organized by bicycle clubs. Experience/ Confident Riders:

- While comfortable on most streets, some prefer on-street bike lanes, paved shoulders or shared use paths when available.
- Prefer a more direct route. May use less direct route to avoid arterials with heavy traffic volumes.
- Avoid riding on sidewalks. Ride with the flow of traffic on streets.
- May ride at speeds up to 20 mph on flat ground, up to 45 mph on steep descents.
- May cycle longer distances.

Casual and Less Confident

This group includes a majority of the population, and includes a wide range of people: those who ride frequently for multiple purposes; those who enjoy bicycling occasionally but may only ride on paths or low-traffic streets in favorable conditions; those who ride for recreation, perhaps with children; and those for whom the bicycle is a necessary mode of transportation. In order for this group to regularly choose bicycling as a mode of transportation, a physical network of visible, convenient and well-designed bicycle facilities is needed. People in this category may move with time to the 'experienced and confident' category. Casual/ Less Confident Riders:

- May have difficulty gauging traffic and may be unfamiliar with rules of the road as they pertain to bicyclists: may walk bike across intersections.
- Prefer shared use paths, bike boulevards, or bike lanes along low-volume, low-speed streets.
- If no on-street facility is available, may ride on sidewalks.
- May ride at speeds around 8 to 12 mph.
- Cycle shorter distances: less than 1 mile to 5 miles is a typical trip distance.

Facility Type

This Plan will provide a general overview of on-street bikeway facility types that could be applied to roads designated as bikeways. This Plan will not specify that facility type to the specific roads, which is expected to be addressed at a later time when a specific project is proposed. The facility designs should generally follow those from the American Association of Highway and Transportation Officials (AASHTO) Guide for the Planning, Design, and Operation of Bicycle Facilities (2012). The County should incorporate some of these and other design standards in its Streets and Roads Design Manual.

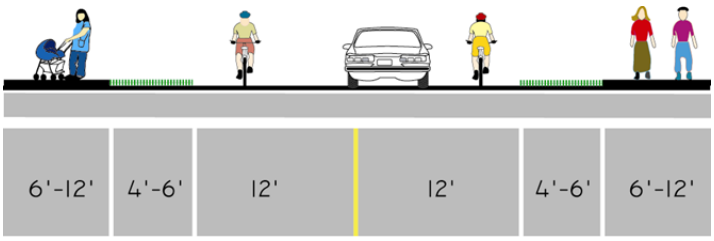
The application of a particular design standard is generally based on the travel speeds and traffic volumes so that roads with a high posted speed limit and high volumes would require a higher bikeway design standard. These standards would provide for greater identification and separation of the cyclist from the travel lanes. Other considerations will also come into play with determining the appropriate design standard for a particular road including:

- Current and expected bicycle use
- Location of origins and destinations that may generate high bicycle travel
- Available right-of-way
- Urban versus rural road types
- The facility types are described starting with the simplest accommodation for bicycles to more extensive designs.

Shared Roadways

All roadways from the local subdivision street to arterial highways can allow for the shared use of the travel lanes for cyclists. For most of these roads there is no signage or pavement markings that would alert the motorists that the road is to be shared with cyclists. Certainly for roads with low travel speeds and low traffic volumes this situation is sufficient for most casual cyclists and certainly for experienced cyclists. In cases where it is desirable to designate a specific bike route, signage and/or pavement markings may be used to provide direction to cyclists of a bike route and to alert motorists to expect cyclists on that particular road.

On a low volume, low speed roadway (i.e., residential or neighborhood streets); many bicyclists can safely share the road with vehicles. Pedestrians should be separated from the roadway with a buffer or a curb. A curb must be present if there is insufficient space for a buffer. The width of the sidewalk or trail should depend on the traffic volume and speeds of the adjacent roadway.



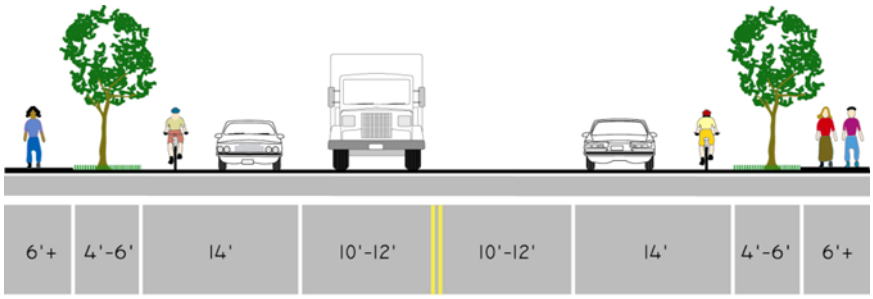
Low Volume, Low Speed Roadway

Shared roadways with pavement markings and signage may be used in both urban settings and on rural roads where there isn't sufficient roadway width to have a full

bike lane. For many rural roads there will not be any shoulder area at all, which would force the cyclists to use the travel lane. Even where there may be minimal shoulders ranging from 1-2 feet in width to perhaps as much as 8 feet wide, the roadways would still function as a shared facility as many cyclists would still use the travel lane.

When new roadways are being constructed it may be possible to provide a wide curb lane in urban areas where the roads would have a closed section with curb and gutter. A typical travel lane is 10-12 feet wide, with a wide curb lane being 14 feet wide, which provides enough space for a cyclist while allowing for a vehicle to pass without having to swerve into the adjoining lane. While wide curb lanes are primarily used on 4-lane divided roadways they can also be applied to 2-lane roadways.

Additionally, if no bicycle lane is striped, the outside travel lane in either direction may be widened to provide enough roadway space so that bicyclists and motor vehicles can share the roadway without putting either in danger.

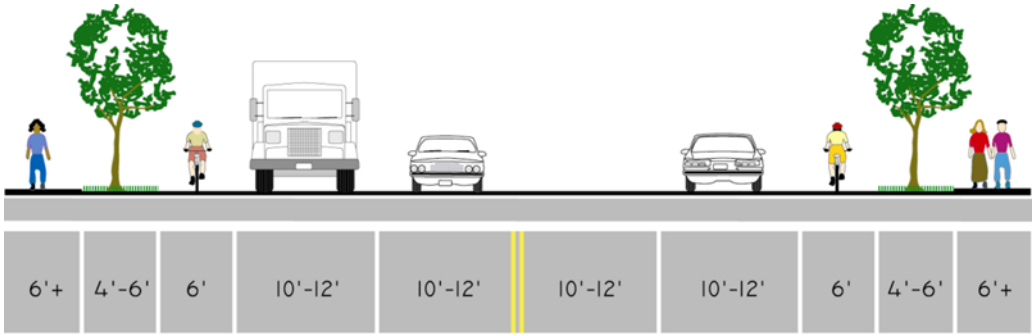


Conventional Bike Lanes

Marked Bike Lanes

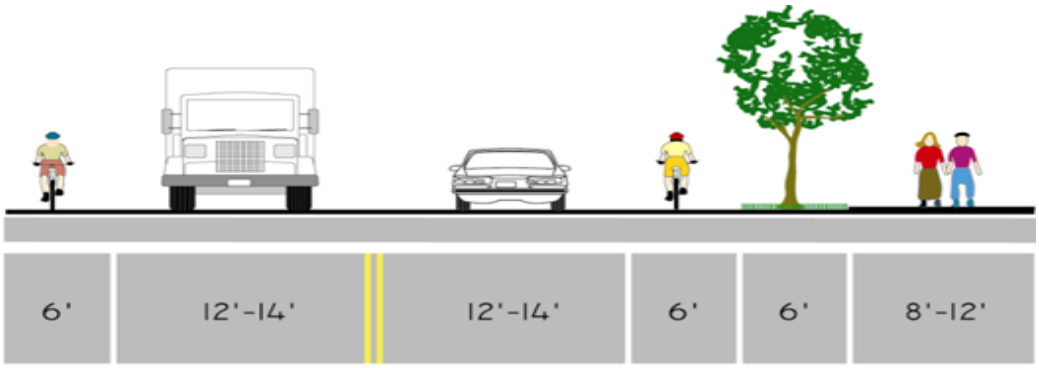
For the casual/basic cyclist bike lanes, which are designated facilities, separation from the travel lanes are preferred. A bike lane will have a painted stripe separating it from the travel lane or any adjacent on-street parking along with pavement markings and signage. While the recommended minimum width of a bike lane is 5 feet, a minimum width of 4 feet may also be acceptable on lower speed roads and if available right-of-way is limited. A bike lane wider than 5 feet is not always desirable as it could then be mistaken for a travel lane and also tends to accumulate more debris which is not cleared by the action of passing vehicles. Bike lanes greater than 5' are however recommended where travel speeds are greater than 50 mph and/or there is a high percentage of truck traffic.

On roadways with 3,000 or more vehicles a day, bicycle lanes should be used to improve bicyclist safety and comfort. A buffer or curb must separate the shared use path or sidewalk from the roadway for pedestrian safety. The width of the bicycle lane, buffer, and sidewalk or path should appropriately reflect the volume and speed of the vehicles using the roadway.



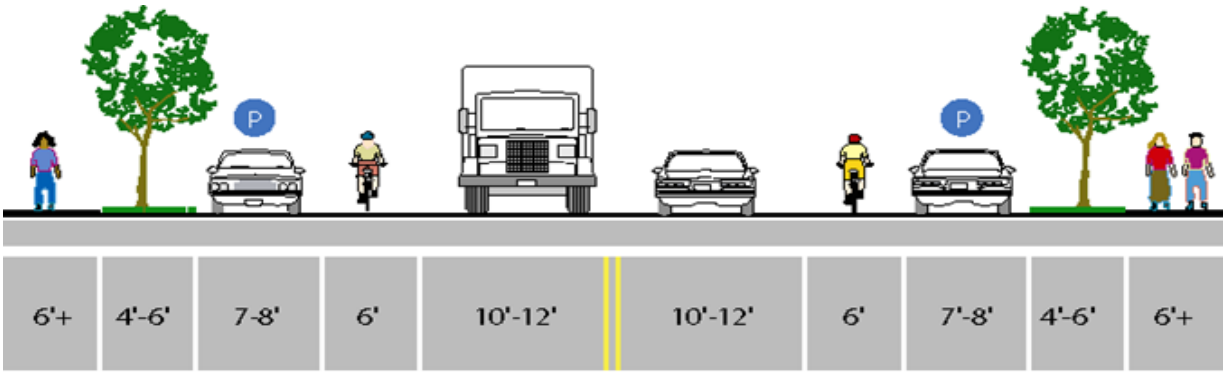
High-Volume, High-Speed Roadway

The above figure illustrates typical bicycle accommodation in urbanized areas. The minimum bike facility width is 4 ft. on open shoulders and 5 ft. from the face of a curb, guardrail, or parked cars, with 6 ft. the preferred width in urbanized areas.



Shared Use Path with Bike Lanes on a High-volume, High-speed Roadway

Some arterials and major collectors can accommodate a shared use path on one side of the roadway and on-street bicycle lanes for more experienced bicyclists (see above). The shared use path provides a comfortable walking space for pedestrians and enables children and recreational bicyclists to ride without the discomfort of riding in a busy street. This configuration works best along roadways with limited driveway crossings and with services primarily located on one side of the roadway, or along a riverfront or other natural feature.



Bike Lane with On-Street Parking on Moderate Volume Roadway

Liability, Safety, & Security

People regularly bicycle roads to access schools, jobs, shopping, transit, and for health and recreation. Various policy statements of AASHTO, the MUTCD, FHWA, and MDOT, County and Municipalities make it clear that it is the responsibility of the state and local agencies to provide reasonably safe accommodations for bicyclists. There have been questions as to whether or not the County would expose itself to liability risks by encouraging bicycling and walking along and across roads. The County's exposure to liability is minimized by designing and constructing the facility in accordance with national and state-issued design standards and guidance from the Maryland State Bicycle and Pedestrian Design Guide, Manual of Uniform Traffic Control Devices (MUTCD) or established AASHTO guidelines. In some instances, providing for the safety of bicyclists will decrease Frederick County's liability exposure. County staff could work with the County attorney's office for clarifications where needed.

On-Street Bicycle Suitability Analysis

Bicycle suitability analysis for on-street roadways is a process as to which a rating system is applied to roadway cycling conditions. In practice the rating process has been called bicycle level of service, bicycle suitability analysis, bicycle level of comfort or similar. This analysis enables an assessment of existing conditions where roadways may be more suitable or comfortable for cycling vs. less so. This assessment takes into account vehicle volumes, vehicle speeds, lane width, and number of lanes, shoulder width, pavement condition and heavy truck volumes. The roadways rated lower on the A-F scale (F being the lowest or worse cycling conditions) can be targeted for on-street bicycle improvements where demand is high such as an existing or proposed commercial and residential growth area. The tool can also be used as a guide for sharing information to the existing or prospective cyclist for use to during their trip planning and route determinations. Figure 3.1 focuses on state highways though a similar assessment could be conducted for county roadways.

On-Street Bicycle Network

An On-Street Bikeway Map showing existing (all SHA) and proposed designated facilities is at the end of this chapter (Fig. 3.2). A larger map is in the pocket at the end of this plan. Table 3.1 below lists all the facilities and identifies those that were deleted and added relative to the 1999 Plan.

Table 3.1 On-Street Bikeways

Projects Deleted from the 1999 Plan

MD 180 (West of MD 17)	Daysville Road	Gapland Road
Apples Church/Roddy Roads	Shookstown Road (West of Kemp Lane)	
Thurston Road	Cherry/Clifton/Old Swimming Pool Roads	

Projects Added

US 40 ALT (Middletown)	MD 31 (New Windsor Road)	MD 194 (Woodsboro Pike): MD 2 to Devilbiss Bridge Road
MD 17 (Brunswick)	MD 85 (Buckystown Pike): English Muffin Way to Crestwood Blvd	MD 355 (Urbana Pike)
MD 26 (Liberty Road)	MD 180 (Jefferson Pike: East of Lander Road)	Ballenger Creek Pike: Mountville Road to Elmer Derr Road
English Muffin Way	Executive Ways	Ijamsville Road
Spectrum/Shockley Connector (future)	Westview Drive	

Projects Remaining from the 1999 Plan

US 40 (Baltimore National Pike)	MD 17 (Burkittsville, Myersville & Wolfsville Rds)	MD 26 (East of Daysville Road)
MD 27 (Ridge Road)	MD 28 (Tuscarora & Dickerson Roads)	MD 75 (Green Valley Road): North of Old National Pike
MD 77 (Rocky Ridge Road)	MD 80 (Fingerboard Road)	MD 140 (Waynesboro Road & Taneytown Pike)
MD 180 (Jefferson Pike): MD 17 to Mt. Zion Road	MD 194 (Woodsboro Pike: North of Devilbiss Bridge Road)	MD 464 (Souder & Point of Rocks Roads)
MD 550 (Sabillasville, Creagerstown & Woodsboro Roads)	Ballenger Creek Pike: South of Montville Road and North of Crestwood Blvd.	Bill Moxley Road
Boyer's Mill/McKraig/Waters Roads	Buffalo Road	Devilbiss Bridge Road
Elmer Derr/Mt. Zion/Mt. Phillip Roads	Gas House Pike	Hessong Bridge/Utica/Halter Roads
Kelbaugh Road	Lander Road	Manner Woods/Michaels Mill Roads
Marker/Monument Roads	Mussetter Road	Mountville Road

Figure 3.1

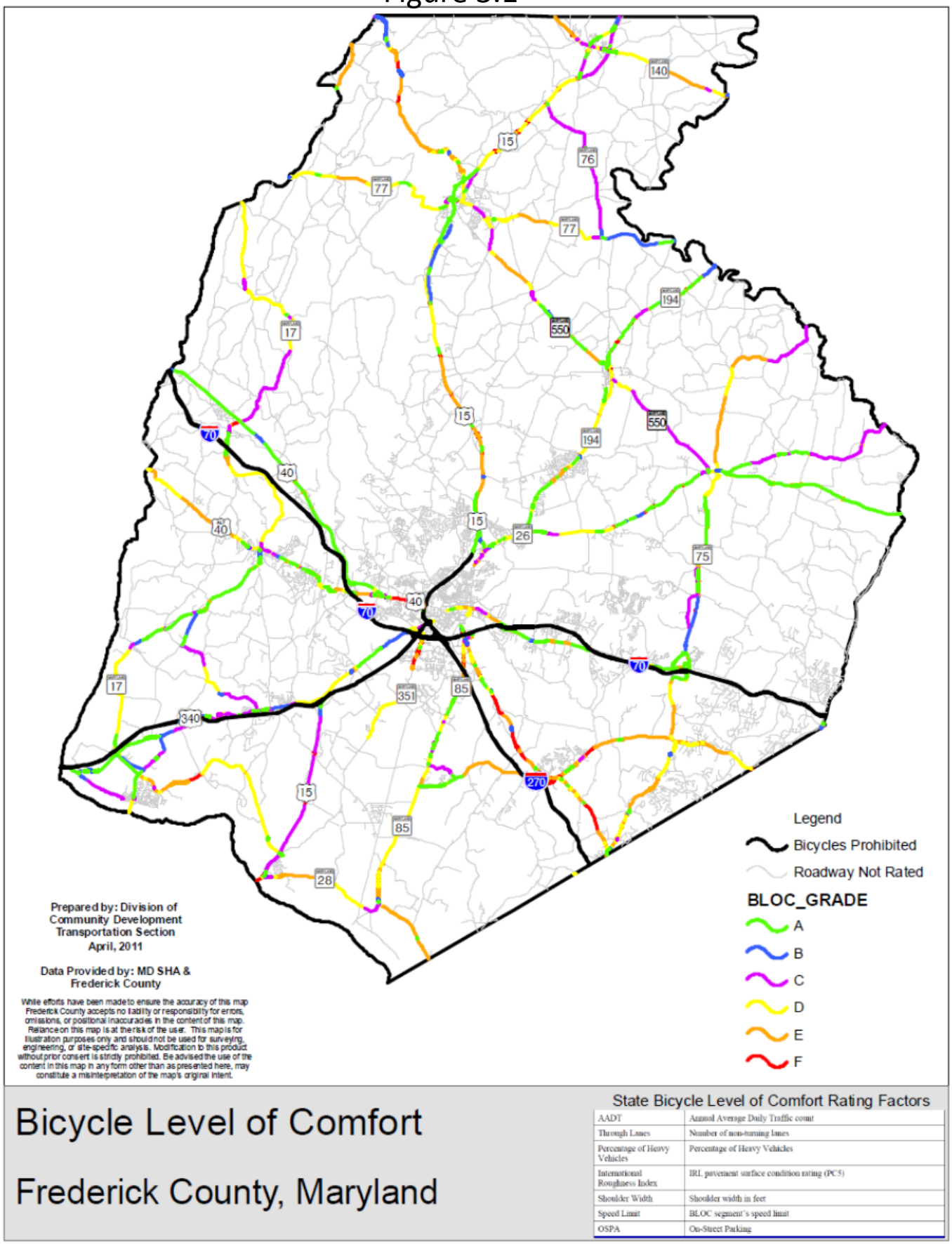
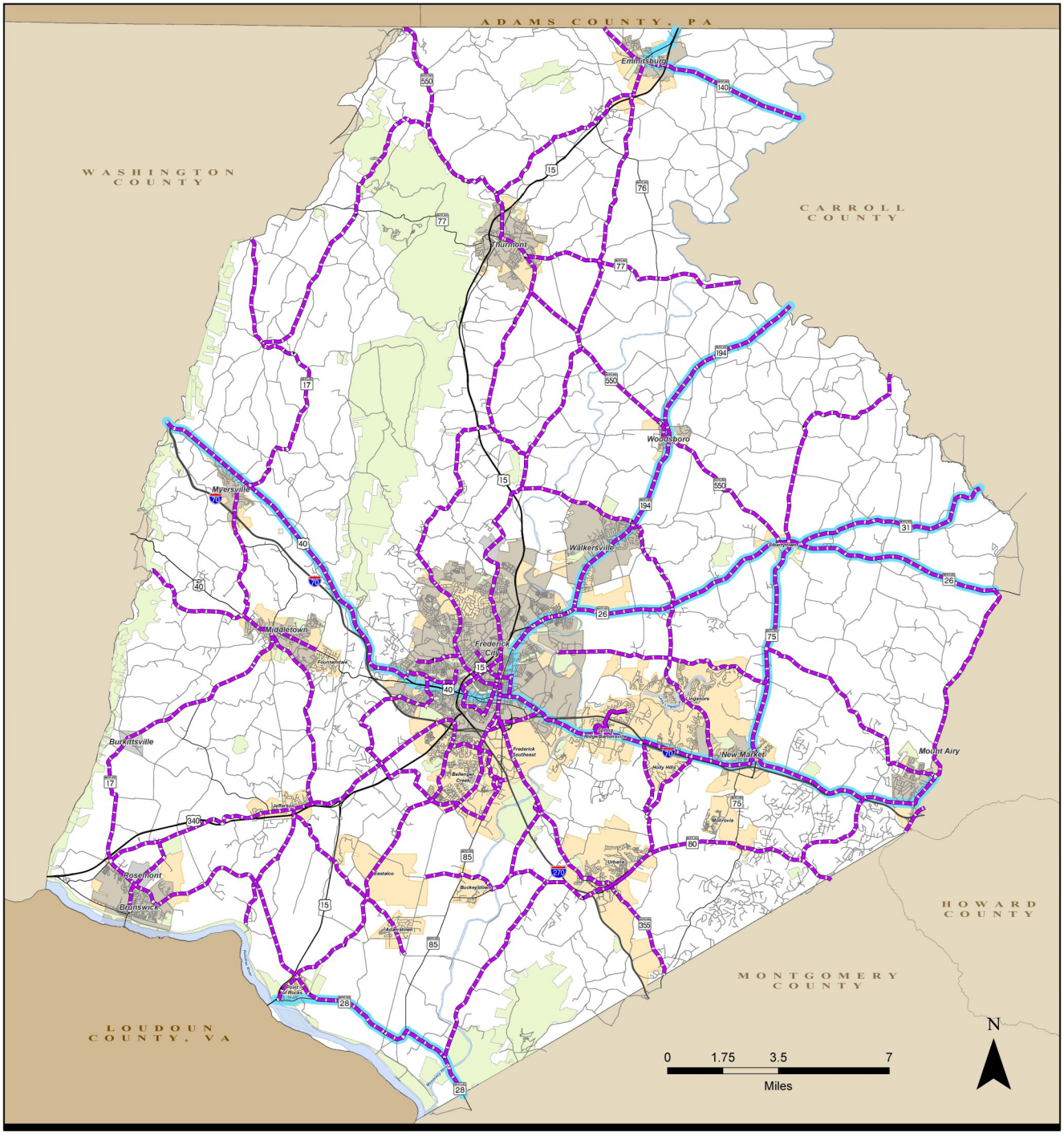

Legend
Bicycles Prohibited
Roadway Not Rated
BLOC_GRADE
A
B
C
D
E
F
Prepared by: Division of Community Development Transportation Section
April, 2011
Data Provided by: MD SHA & Frederick County
While efforts have been made to ensure the accuracy of this map Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis. Modification to this product without prior consent is strictly prohibited. Be advised the use of the content in this map in any form other than as presented here, may constitute a misinterpretation of the map's original intent.
Bicycle Level of Comfort
Frederick County, Maryland
State Bicycle Level of Comfort Rating Factors
AADT
Annual Average Daily Traffic count
Through Lanes
Number of non-turning lanes
Percentage of Heavy Vehicles
Percentage of Heavy Vehicles
International Roughness Index
IRI, pavement surface condition rating (PCS)
Shoulder Width
Shoulder width in feet
Speed Limit
BLOC segment's speed limit
OSPA
On-Street Parking

Figure 3.2



Bikeways & Trails Plan
On-Street Bikeways
Recommended Plan - December 2017

On-Street Bikeway, Existing
On-Street Bikeway, Proposed
MDOT Bike Routes
Parks
Municipalities
Community Growth Areas

Frederick County, Maryland
Division of Planning and Permitting

January 05, 2018
Frederick County GIS

Projection: NAD 1983 State Plane Maryland FIPS 1900 Feet
While efforts have been made to ensure the accuracy of this map, Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis.

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4. Multi-Use Trail Network

Planning Concepts

Follow Linear Features

Most trail facilities follow some type of existing linear feature such as streams and rivers or existing/abandoned railroad lines. In some cases utility corridors such as electric transmission lines, although not aesthetically pleasing, could also be considered to establish trail corridors. These linear features offer the best opportunity to create long and continuous trails either within a community or traveling cross country without significant land use impacts. Here are some examples of common linear applications:

Shared Use Paths & Utility Right-of-ways

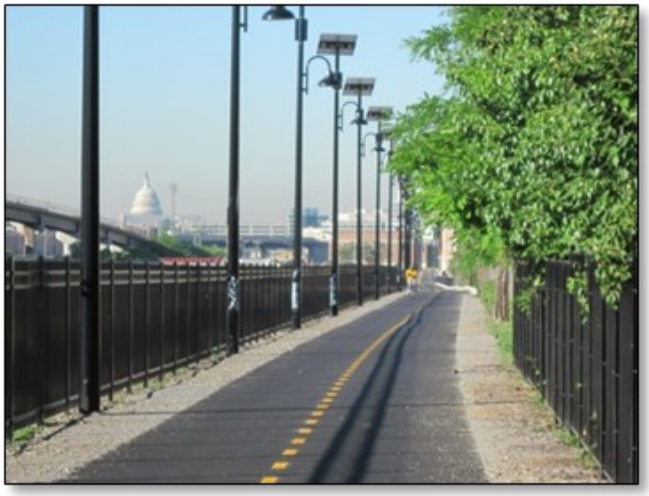
Since finding an intact linear corridor is one of the most challenging aspects of path implementation, one consideration for siting trails is co-locating in utility right-of-ways. Design factors that should be considered include: safety and security of utility and trail user, types of use, surface treatments and access to utilities. Use agreements should be drafted that document the roles of the utility provider, the trail designer and maintenance, and the trail user.

Rails with Trails (Active Rail Corridors)

Another successful method of pathway implementation is co-locating in active rail corridors. Active rail corridors vary by volume and speed of trains and design treatments should be adjusted as appropriate to maintain maximum safety. Approximately two-thirds of the known existing rail-with-trails (RWT) in the United States were adjacent to freight or industrial dominated rail lines.

Appropriate setback and separation techniques are key issues for potential rail-with-trail projects. While Maryland does not have any standard RWT design standards, there is at least one example of a RWT in the State. The Western Maryland Scenic Railroad (WMSR) that runs from Cumberland to Frostburg has a parallel gravel trail. The WMSR even markets the possibility of traveling the train one direction with your bicycle so that you can ride back. In 2010, of 32,000 paid riders on the WMSR, 2,100 travelled with their bicycles.

The Walkersville Southern Scenic Railroad is the most likely possible application of the RWT concept in Frederick County because of the low volume and speed of the scenic railroad. While safety can be easily managed on a low speed scenic railroad, consideration for implementation of a RWT on higher speed, higher volume rail lines could still be feasible assuming appropriate setback precautions are included in the design. Because of the lack of standards on setback distances, the appropriate distance must be determined on a case-by-case basis.



Frederick County projects could incorporate the following technical factors, including:

- Type, speed, and frequency of trains in the corridor
- Separation technique: (consider fencing for sections within minimum required setback of 12 ft)
- Topography
- Sight distance: (varies along corridor, limited due to encroaching vegetation)
- Maintenance requirements and
- Historical problems

Rails to Trails

From the 1890's to 1953 Frederick County was served by an electric trolley system that connected Thurmont, Frederick, Middletown, Myersville, and Jefferson. The long since abandoned right-of-way from this system is proposed to be converted to trails between Thurmont and Frederick and from Frederick through Middletown to Myersville. In 2017, the first leg of this trail opened in Thurmont.

Side Path Trails in Highway Corridors

This Plan introduces a relatively new concept for locating a trail facility where there isn't an appropriate stream corridor or rail-trail opportunity. This facility concept is called a sidepath, which is conventional multi-use trail located within the right-of-way of limited access highway or arterial road corridors. Highways provide opportunities for long distance connections and are especially useful to fill gaps for regional path connections. There are a number of such sidepath trails in Maryland and the DC region including:

- US 50 in Queen Anne County, MD
- I-66 in Arlington County, VA
- Route 9 in Berkeley County, WV
- MD 200 (ICC) in Montgomery and Prince Georges County, MD.

Key planning and design considerations for highway trails include:

- Ideally should be designed and constructed as part of a new highway project. More likely scenario will be to retrofit a trail along an existing highway.
- Total amount of available right-of-way and adjoining land uses.
- Type of barrier between the roadway and the trail – fencing, landscaping, grade differences
- Ramp, interchange, and bridge crossings

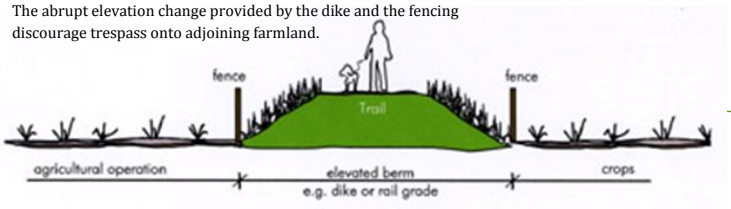
In addition to using limited access highway corridors is the ability to locate trails along collector or arterial type roadways. What are described as sidepaths may also be constructed along arterial type roadways generally in place of a conventional sidewalk and for an appreciable distance. A key design requirement in this case is placement of a roadside path only where the road has minimal driveway cuts and access points, which can present a safety problem from turning vehicles.

Shared Use Paths & Agriculture

If well designed and managed, trails can achieve a high level of compatibility with the farms and ranches they pass through. Key aspects of trail planning and design include:

- Involve Agricultural Community - Trail planning should involve a strong partnership between the agricultural community and trail proponents. A key to successful trails in agricultural areas is the continued involvement and input of farmers and ranchers, throughout the planning and management processes.
- Trail Routing - Trails should be directed away from/ around agricultural areas wherever possible.
- Buffers - Leaving a visual or physical barrier between trail users and sensitive areas of a farm or ranch can offer privacy and security. Five basic types of agricultural buffers include: fencing, physical separation, water features, vegetation, and elevation differences.
- Signage & Education - A well-designed, coordinated sign system can help ensure smooth, efficient trail management. Four general types of trail signs include: do's and don'ts, trail information, interpretive and advertisement.
- Lighting— Low level trail lighting may be necessary for security reasons and must be designed to minimize light spillage off the trail.
- Education – Providing trail usage rules specific to the agricultural area through signage or written materials should be included in the design plan.

The abrupt elevation change provided by the dike and the fencing discourage trespass onto adjoining farmland.



One alignment under consideration for the Emmitsburg and Mount St. Mary's Trail would fit into this category of trail.

Transportation/Connectivity

Though a primary use of trails is for recreation they can also serve a transportation function by connecting where people live with destinations such as schools, shopping centers, and employment areas. This is certainly the case for those trail corridors that are mostly or entirely within a community growth area. Beyond these areas trails that extend across large portions of the county will be primarily used for recreation and exercise.

Regional Connections

Looking beyond providing trail connections within the county is the opportunity to connect with existing and planned regional trails. Frederick County has several corridors identified in this plan that have the potential to link with other trails to provide regional and statewide trail connections. The proposed trail corridors will provide connections to both the C&O Canal and the Appalachian Trail. Trail corridors are also proposed to connect with potential trails along the Patapsco and Patuxent Rivers in Howard and Montgomery Counties; the I-270 Corridor Transitway; and along Little Bennett Creek.

Accommodate Multiple Users

As the name implies multi-use trails can accommodate a variety of activities. Depending on the design and the surface material, a multi-use trail can be used by walkers/hikers, cyclists, in line skaters, equestrians, and cross country skiers. Since many of the trails are proposed within stream valleys there are opportunities for those persons who want to use the trail to experience the natural setting of the corridor.

This Plan recognizes the need for additional study for each of the off-street trail corridors identified here. Described below are general issues that will need to be addressed in most if not all of the corridors. The corridor profiles identify additional issues that are specific to that particular corridor.

Issues Involving Trails

Property Impacts

Since there is very little land under public ownership along the streams and other corridors, the County will need to work with multiple property owners during corridor studies. It will be very important to bring the property owners into the process as early as possible. However, it is the longstanding policy of Frederick County, not to acquire property for trail projects, either in fee simple or easement, from property owners that are unwilling to sell. Even though a trail project represents a public benefit, this plan makes no proposal to modify this policy. This is consistent with the policies of most other jurisdictions in Maryland. The bottom line is that individual property owners rights are always honored and protected.

If however a land development proposal is submitted to the county for approval, and if there is an identified master plan trail within or contiguous to the property, and if the development would benefit from the recreational or commuting benefit of the trail, once fully built, it is expected that that developer would either dedicate land at subdivision and/or build it on or along property frontage as determined at site plan.

Where land within a trail corridor is owned by a homeowners association there may be opportunities for the homeowners association to assume some of the responsibilities for maintenance of the trail through their property. Agreements or easements with the respective government jurisdiction would be necessary to outline the responsibilities and liability.

Land Preservation Easements

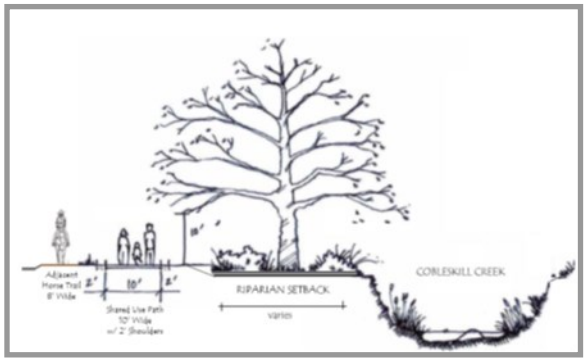
Several planned trail corridors traverse agricultural areas, which may include parcels under an agricultural preservation easement or a forest resource ordinance (FRO) easement. While the existence of an easement does not completely preclude accommodating a trail, it would require a review and approval by either the state or the county depending on which jurisdiction holds the easement. FRO easements are typically smaller and concentrated along streams. Ideally if a trail alignment has been established to some detail, then any subsequent application for a land preservation easement should not deter but accommodate the ability to construct a trail in the easement document.

Environmental impacts

With trail corridors identified along streams and the Monocacy River it will be important to consider the environmental impacts related to having a trail in close proximity to the stream. The delineation of the various environmental features and how they would be protected would be addressed during the planning and design phases described under the corridor studies. The County's water body buffer ordinance was amended and now prohibits impervious surfaces within the water body buffer. This restriction would either require the trail to be further from the stream or would allow the use of a pervious paving material.

The following checklist should be reviewed during the feasibility study and design phases of the trail development process.

1. Has alternative alignment been considered?
2. If it is in the flood plain, should there be a specific preferred riparian zone setback?
3. Has permeable asphalt been considered? (If State or Federal funds are being used, surface changes need to be approved and accessible)
4. Before and after analysis of the river flood model to demonstrate that the path construction would not significantly alter the flood profile. (most studies have shown impact on flood elevation as "insignificant")
5. Has use of parallel bio-swales been considered in design?
6. Has on-site fill and grading been minimized?
7. Have impacts to the following been addressed?
    - Stormwater & Wetlands
    - Archeology and Historic Sites
    - Steep slopes



Liability, Safety, & Security

Trail safety is a major concern for both trail users and those whose property is adjacent to a trail. Creating a safe trail environment goes beyond design and law enforcement and should involve the entire community. The most effective and most visible deterrent to illegal activity on the trail will be the presence of legitimate trail users. Getting as many "eyes on the corridor" as possible is a key deterrent to undesirable activity.

Safety would be addressed on Frederick County Trails in the following manner:

- Adhere to the established design, operation, and maintenance standards presented in this document.
- Supplement these standards with the sound judgment of professional engineers.
- Maintain adequate recording and response mechanisms for reported safety and maintenance problems.
- Thoroughly research the causes of each reported accident on Frederick County Trails
- Respond to accident investigations by appropriate design or operation improvements.
- Design the paths, structures, and access points to be accessible by emergency vehicles. Bollards at the path entries should be removable by the appropriate fire, ambulance, and police agencies.
- Provide regular police patrols to the extent needed.
- A well-maintained trail sends a message that the community cares about the public space. This message alone will discourage undesirable activity along the trail.

Often trails will be located directly adjacent to private properties along some of its proposed alignment. Neighbor concerns regarding overcrossing/path location near their properties typically include a loss of visual privacy, and concerns about increased crime, vandalism, noise, and fire. Wherever possible, the right-of-way should be located as far away as possible to protect the privacy of adjacent property owners. Criminal activity is not likely to occur along an overcrossing or path that is well planned, designed, operated, maintained, and used.

Facility Types and Design Standards

This Plan will not provide a detailed description of the design standards for the various trail facility types. In 2003 the County Division of Parks and Recreation prepared a Bikeway and Trail Design Standards and Planning Guidelines document that provides greater detail on construction and design standards. This document also addresses road crossings, bridges and trailhead amenities. Another reference for design standards and guidelines is the AASHTO Guide for the Development of Bicycle Facilities, 4th edition, 2012.

Natural Surface Trails

These trails will be primarily for pedestrian/hiking use though some may also be able to accommodate equestrians and mountain biking depending on the design and any use restrictions for a specific trail. As the name implies these trails will not be improved with a surface such as asphalt or crushed stone but will consist of the natural dirt surface with a variable width. The Appalachian and Catoctin Trails are examples of natural surface trails.

A specific standard for natural use trails is not provided. The design of these trails will be dependent on the topography, vegetation, use restrictions, and the proximity of environmental features such as streams. These trails should attempt to blend in with the surrounding natural environment as much as possible. In some high use areas these trails can be improved with small gravel or wood chips.

Equestrian use can be accommodated through a variety of natural surface trails or parallel to hardened surface trails. In addition, an important infrastructure improvement for horse users is the ability to park and maneuver their trailers and trucks.

Multi Use Trail

These trails are specifically designed to accommodate several different users, including walkers/hikers, bicyclists, equestrians, and in- line skaters at the same time. During the winter months the trails can be used for cross country skiing. This Plan recognizes that multi-use trails can serve both a recreation function and for transportation. The detailed corridor studies that are recommended to be undertaken following adoption of this plan would address issues such as the ability to accommodate equestrians on a particular trail. The corridor studies would also determine the type of surface for the trail which would affect overall construction cost and the in line skaters who require a paved surface.

The surface material used on multi-use trails includes either a compacted crushed stone, concrete or most typically asphalt. Other options now available include pervious paving that can minimize water run-off and allow for a trail within a water body buffer. The crushed stone surface is generally cheaper to construct and provides a hard surface which can accommodate most bicycles. An asphalt surface would be suitable for all types of bicycles and can also accommodate in-line skating.

The Ballenger Creek Trail (pictured below) is our most recently constructed multi-use trail.

Ballenger Creek Trail

The minimum recommended width of a multi-use trail is now 10 ft. though it can vary from 8 ft to 12 ft. depending on any design constraints or in heavy use areas that may warrant a wider trail. Although substandard, an 8 ft width can be adequate for trails through rural areas that are not expected to have heavy traffic. Within the more developed areas, a 12 ft width is desirable.

Since many of the trail corridors are proposed along streams and the Monocacy River special consideration will need to be taken to minimize any adverse impacts on the

stream or adjoining wetlands. Issues related to the environmental impacts from trails would be addressed as part of more detailed studies of individual trail corridors.

Sidepath

The sidepath is a new facility type to be considered in this Plan. While these facilities will function as a multi-use trail they are specifically located along and within the right of way of a parallel roadway. While this type of path may look like a sidewalk they differ in the following respects:

- A sidepath is able to accommodate two-way bicycle travel as well as pedestrians
- A sidepath is wider (typically 8-10 feet) than a sidewalk (typically 4-5 feet)
- They will most often will be constructed with an asphalt surface rather than concrete

The other unique feature of the sidepath is that they are typically constructed on just one side of the roadway or highway so they would need to accommodate two-way travel for bicyclists. In more developed suburban and urban areas there may also be a conventional sidewalk on the opposite side of the roadway that also has a sidepath.

Guidelines for Sidepaths

- Typically located along roadways with relatively high volume and high speed vehicle traffic where cycling on the roadway is not safe.
- Can be used for short connections to provide continuity in multi-use trail or to connect local streets and neighborhoods for better bicycle access.
- Should be located along roadways that have few driveway and street crossings
- May be considered for longer distance connections where there isn't any other corridor feature (i.e. stream corridor or old railroad line) that could accommodate a multi-use trail.

Trail Surface Options

When approaching a trail project, trail designers and local agency representatives often assume their trail will be surfaced with asphalt or perhaps concrete if budget allows. These are some of the most common and acceptable materials used on trails. However, this may not be what local residents had in mind when the trail idea was initially conceived. Or, local residents may not have considered the trail surface until a specific surface was proposed. Trails typically serve a transportation function, but most trail users do not want a trail to appear as a mini-roadway. This often leads designers into an exploration of possible trail surfacing options, including:

• Traditional asphalt and concrete	• Limestone treated surfaces
• Permeable asphalt and concrete	• Rubberized surfaces
• Commercial soil stabilizers	• Organic surfaces, such as bark mulch and wood planer shavings
• Geotextile confinement systems	• Agricultural by-products such as filbert shells
• Chip seal	• Wood in the form of boardwalks
• Crusher fines	

Asphalt

Crusher Fines

Natural Surface Trail

Trail and Pathway Surface Assessment Review Checklist

The following review items should be reviewed during each trail feasibility study and design phase:

- Initial Capital Cost – Trail surface costs vary dramatically and dollars to build trails are scarce. Construction costs include excavation, subbase preparation, aggregate base placement, and application of the selected trail surface.

- Maintenance and Long Term Durability – The anticipated life of a trail surface can vary from a single year (bark surface in a moist climate) to 25+ years (concrete). In addition, each trail surface has varying maintenance needs that will require regular to sporadic inspections and follow-up depending on the material selected. Some surface repairs can be made with volunteer effort such as on a bark surface trail, while others, such as a concrete surface, will require skilled craftsmen to perform the repair.

- Existing Soil and Environmental Conditions – Soil conditions are a given and play a critical role in surfacing selection. Rail-to-trail projects are often gifted with an excellent base on which to build a trail. But a surface such as chip seal has a greater chance of developing a wash boarding effect over time due to "railroad tie memory." In addition, when considering the use of a permeable concrete or asphalt surface, the success rate of these surfaces is directly correlated to the permeability of the soil and climatic conditions. The lower the permeability and moisture, the greater risk of failure.

- Availability of Materials – A great trail surface in one area of the country may prove cost-prohibitive in another area due to availability of materials. Limestone-treated trail surfaces are common in the eastern US, but unheard of in the west due to a lack of limestone. There are also some environmentally sound ideas such as the use of recycled glass in asphalt (called "Glassphalt"), but because this is not done on a large scale basis, finding a source for the glass aggregate may prove difficult.

- Anticipate Use/Functionality – Who are the anticipated users of the trail? Will the trail surface need to accommodate equestrians, wheelchairs, maintenance vehicles, bicycles, etc.? Multiple use trails attempt to meet the needs of all anticipated trail users. But this may not be feasible with a single trail surface. Consider the shoulder area as a usable surface, making it wide enough for use by those preferring a softer material. Each surface also has varying degrees of roughness and therefore accommodates varying users. In-line skates, for example, cannot be used on a chip seal surface or most permeable concrete surfaces due to the coarseness of the finished surface.

- Funding Source – The funding source for the trail may dictate the trail surface characteristics. If the trail has federal funds and is being administered through the Maryland Department of Transportation (MDOT), they will need to review and approve the selected trail surface.

- Susceptibility to Vandalism – Trail surfaces are not usually thought of as being susceptible to vandalism, but the characteristics of the varying surfaces do lend themselves to a variety of vandalism including movement of materials such as gravel or bark, graffiti on hard surfaces, arson (wood and rubber surfaces), and deformation.

- Aesthetics – Each trail surface has varying aesthetic characteristics that should fit with the overall design concept desired for the project.

Planned Network and Corridor Profiles

The 1999 Plan proposed a network of approximately 174 miles of new multi-use trails within 18 distinct corridors throughout the county and within several municipalities. These trails would augment several existing trails including the C&O Canal towpath (16 miles), the Appalachian Trail (31 miles), and the Catoctin Trail (35 miles).

An effort was made to be consistent with like plans from neighboring jurisdictions as well as Fredrick county municipalities and the City of Frederick. This would help maintain continuity of facilities at political borders and accommodate longer term travel.

Corridor Profiles

Trail Project Profiles, which are in Exhibit number 6 of the Appendix, highlight some corridors/trails that are located primarily in the county's jurisdiction and would be the County's responsibility to fund and manage the projects. On a grander scheme, some of our trails complement more regional trail systems such as the existing C&O Tow Path and proposed Grand History Trail.

Grand History Trail

The Grand History Trail (GHT) proposes to connect, using off-street trails, major historic communities in Maryland, Washington D.C. and southern Pennsylvania. The concept to create a 185-mile loop trail was initiated by the Rails to Trails Conservancy in 2005. The GHT would piece together approximately 100 miles of existing trails to connect York PA, Baltimore, Annapolis, Washington D.C., Frederick, and Gettysburg.

The trail would follow the C&O Canal towpath from Washington into Frederick County. From the canal towpath the route would traverse the entire length of the county through the City of Frederick to connect with Gettysburg. Frederick County is the biggest gap within which there are only a few miles of existing trails that could be part of the GHT. With the proposed deletion of the southern portion of the Monocacy Trail, the GHT would have to use a combination of on-street and off road sidepath bikeways, likely in the New Design Rd. corridor, to connect the C&O Canal towpath to Frederick City. Within the City the route could transition from New Design Rd. to S. Market St. to the Carroll Creek Trail. The western terminus of the Carroll Creek Trail would connect with the H&F Trolley Trail, which continues to Thurmont. From Thurmont to Emmitsburg the route would likely have to use an on-street bikeway along Kelbaugh and Old Emmitsburg Roads. With its completion, the far northern part of the County, greater Emmitsburg would be connected with the southern most part, the C&O towpath.

Main Streets Connector

The state designated "Main Street" communities of Brunswick, Frederick, Middletown, Mt. Airy, and Thurmont would like to complete a trail plan that connects all of these communities by bike paths – both on and off street- that are comfortable to casual bike riders of a range of ages. A focus of the ultimate system will be to attract economic development and increased tourism spending in all of the Main Street communities. The Hagerstown and Frederick Trolley Trails would connect Thurmont with Frederick and Frederick with Middletown. Brunswick and Mt. Airy would be connected by on-street bikeways, largely along MD 180 and Old National Pike, respectively.

I-270 Trail

As part of the I-270/US 15 Multimodal Project, now proposed to be completed by 2025, MDOT SHA should give strong consideration to constructing this trail, as they did along the Intercounty Connector (MD 200) in Montgomery County. This trail would largely be built adjacent to the I-270 right-of-way or in right-of-way already reserved by the County for the I-270 transit line, long since eliminated by MDOT SHA as a viable transportation element.

Changes to the 1999 Plan

This Plan starts with the 1999 Plan with an assessment of the multi-use trail corridors to determine whether corri-

dors would be deleted or revised. New corridors would also be considered to be added to the Plan (see Table 4.1 for a complete list). The assessment of the 1999 Plan considered the general feasibility of a trail and whether it provides connectivity between growth areas or other major origin/destination. With the exception of the Emmitsburg Railroad Trail all of the other trails proposed to be deleted are along streams or the Monocacy River. The streams and river corridors present a number of feasibility issues including topography, impact on farm operations, ability to secure right-of-way from private property owners, and environmental impacts to the riparian buffer along the streams. Most of these stream corridors also lack connectivity to a growth area or other significant destinations. A map (Figure 4.1) is provided at the end of this chapter. A larger map is located at the end of the plan.

Prioritization for Corridor Studies

A prioritization process, addressed also in the Implementation Chapter, will feed into the process of identifying which trail corridors should be funded in the county's Capital Improvements Program (CIP) for more detailed corridor studies and eventually design and construction, and in which priority. While this process will be focused on projects that would be the County's responsibility it may also address projects within a municipality that may connect with a trail in the County. Some factors used to assist with setting priorities include:

- Availability of right-of-way and ownership (public versus individual private ownership)
- Engineering and environmental feasibility issues
- Does it connect with, or fill a gap, in an existing trail?
- Would it serve both a recreational and transportation purpose?
- Connections between growth areas
- Degree of public support
- Relative cost

Since this Plan identifies trail corridors in a very conceptual nature they will often need to go through an initial feasibility/planning study before a more detailed design/engineering phase can be conducted. It should be noted that a given trail project may need to compete with other priorities at each of the various stages, feasibility study/planning, design/engineering, and construction.

Preliminary Recommended Trail Project Priorities

The following trails listed alphabetically and in no priority order, are projects that would primarily be the county's responsibility, though some will require coordination with the respective municipality or the State. These trails, some being phases of longer trails, would be expected to be priority facilities for CIP project starts in the near to midterm future, subject to confirmation from a more detailed prioritization ranking, as delineated in Exhibit #7 of the Appendix:

- Ballenger Creek Trail – complete western section, Phase VI (3,600 feet/0.7 miles) from Ballenger Creek Pike to the County's Ballenger Creek Park. Part County and part developer funded, expected to be complete by 2020.
- Emmitsburg - Mt. St. Mary's Trail – proposed sidepath (2.1 miles) or alternatively a direct off road trail, to connect the Town of Emmitsburg and the Mt. St. Mary's University campus. The County has allocated $140,000 towards design and construction to be matched by the Town and the University.
- H&F Trolley Trail – Phase 3 (2.7 miles): Moser Rd. in the Town of Thurmont to the Catoctin Furnace site , looping back to the town via Cunningham Falls State Park; one leg of the main street connector system.
- Frederick Scenic Trail – construct a gap (1.2 miles) along the Monocacy River in the Waterside development (in the County) between an existing trail section along Tuscarora Creek in the City's Worman's Mill development and the existing trail in the Dearbought development.

- New Design Road Sidepath—an extension of the existing New Design Road bikeway that runs from the City of Frederick near Harry Grove Stadium to English Muffin Way; this path would run parallel and contiguous to New Design Road from English Muffin Way to the C&O Towpath for a total of 8 miles: a possible Frederick to Brunswick Main Street Connector alignment.
- Pennsylvania Railroad Trail (Monocacy Crossing Trail) – proposed trail with rail from the Mill Island Subdivision (just north of Monocacy Blvd.) to the Town of Walkersville's Heritage Farm Park (4.1 miles). Frederick City is implementing the section along, and in some sections within, East Street, from the Frederick MARC station to just north of Monocacy Blvd. (scheduled to be completed by 2020).

Chapter 5 proposes prioritization techniques that can be used by staff to assist County elected officials in prioritizing, as well as phasing priorities for a long project.

Table 4.1 Off Street Multi-Use Trails

Projects Deleted from the 1999 Plan

Catoctin Creek Trail	Emmitsburg Railroad Trail	Walkersville-Woodsboro Corridor (northern portion from Woodsboro to the Carroll County line)
Frederick Scenic Trail (southern portion from Monocacy National Battlefield to MD 28)	Glade Creek and Israel Creek options of the Walkersville-Woodsboro Corridor	Sugarloaf Mountain Park Natural Surface Trail (Northern alignment)
Linganore Creek Trail (eastern portion from Gas House Pike to the Carroll County line)	Bush Creek Trail (MD 75 to Montgomery / Howard Counties)	

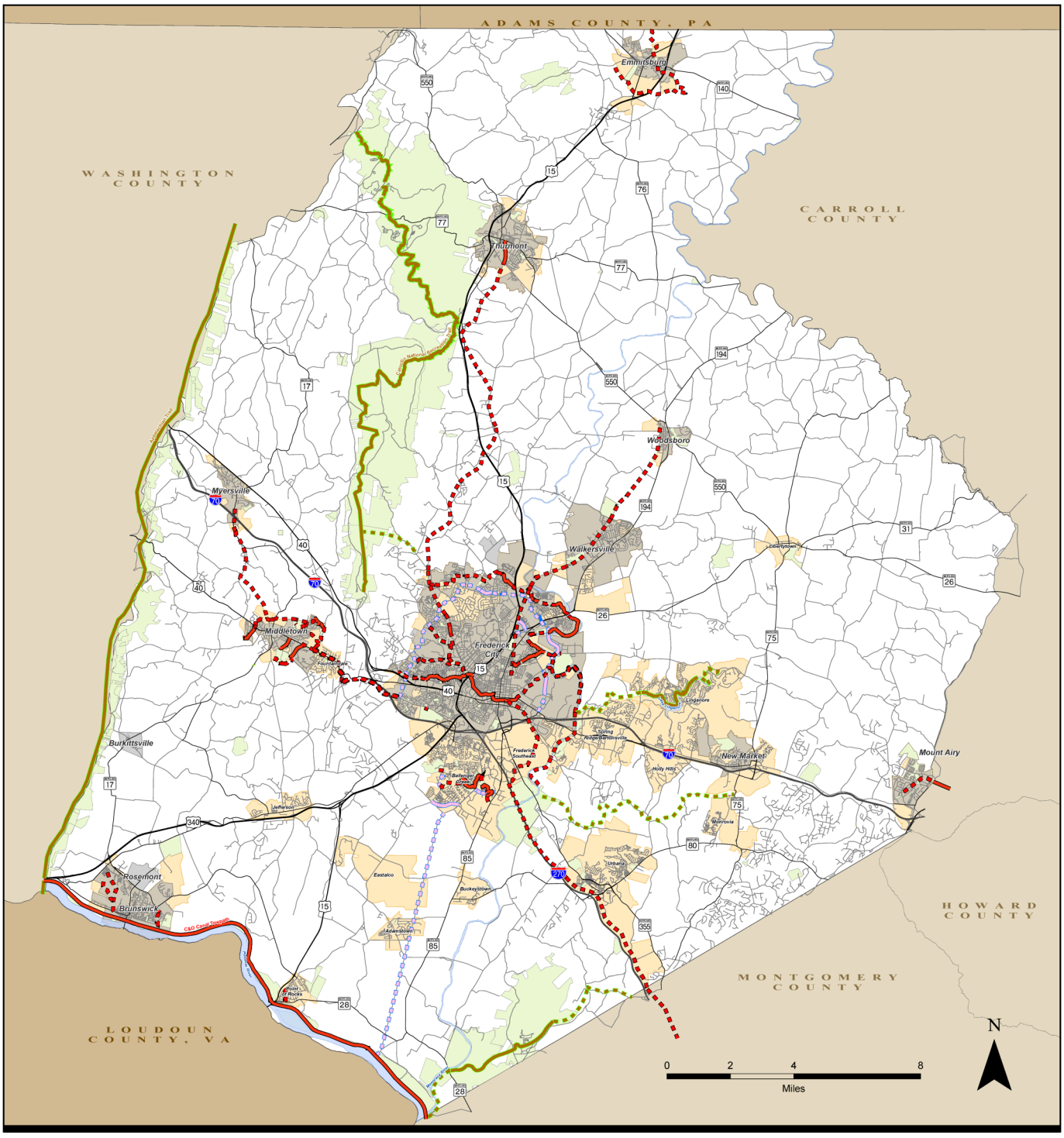
Projects Added

Mount St. Mary's University to Emmitsburg Trail (sidepath or trail)	City of Frederick to C&O Towpath Connector (along New Design Road between English Muffin Way and C&O Towpath sidepath)	

Projects Remaining from the 1999 Plan

Emmitsburg Area Trails	Ballenger Creek Trail remainder	Linganore Creek Trail (western portion from Monocacy River Trail to Gashouse Pike—partial not public)
H&F Trolley Trails (Thurmont/Frederick/Middletwon/Myersville)	I-270 Transitway Trail	Pennsylvania RR Trail (East St. Trail in Rail to Woodsboro)
Frederick Scenic Trail (City of Frederick south to Monocacy Battlefield)	Bush Creek (CSX) natural Surface Trail (West of MD 75)	Little Bennet Creek Natural Surface Trail Remainders (not public)
Catoctin Mountain Recreation Trail Spur to Yellow Springs Road	City of Frederick and Municipal Trails	

Figure 4.1



Bikeways & Trails Plan
Off-Street/Multi-Use Trails

Recommended Plan - December 2017

Existing	Proposed			
		Multi Use Trails		Parks
		Natural Surface Trails		Municipalities
		Side Path		Community Growth Areas

Frederick County, Maryland
Division of Planning and Permitting

January 05, 2018
Frederick County GIS

Projection: NAD 1983 State Plane Maryland FIPS 1900 Feet
While efforts have been made to ensure the accuracy of this map, Frederick County accepts no liability or responsibility for errors, omissions, or positional inaccuracies in the content of this map. Reliance on this map is at the risk of the user. This map is for illustration purposes only and should not be used for surveying, engineering, or site-specific analysis.

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5. Implementation

This chapter addresses how the construction of the trail corridors and on-street bikeway facilities proposed in this Plan may be carried out. As funding is a critical piece to implementing this Plan, an overview of state and federal funding programs is provided. In addition to the county's use of these funding programs is the opportunity for private/non-profit organizations to apply for these programs. This leads to another critical component of implementation and that is public advocacy. Frederick is experiencing a growing advocacy for trails and bicycle improvements that can lead to making the implementation of this Plan a priority for the County.

Implementing the proposed projects and action items in this document is the most important part of any plan. Specifically, this Plan will propose priorities for trail and bikeway projects to provide initial guidance for funding decisions. Funding bicycle and pedestrian projects should be balanced with all other modes of transportation not only in the support of existing mode shares but also a consideration of future mode share goals.

Project and Planning Process

This Plan provides a conceptual location of the multi-use trail corridors that are expected to go through additional planning level study prior to moving into the design and construction phases. For the on-street bikeway component there will also need to be more detailed assessment to determine the appropriate bikeway improvement for a given road. For projects that the County will be responsible for implementing there will be four basic phases to go through each with their own capital funding needs. These phases are:

1. Planning
2. Design/Engineering
3. Right of Way or Easement Acquisition
4. Construction (Including Utility Relocation)

For trail projects the planning phase would be coordinated between the Division of Planning & Permitting and the Division of Parks and Recreation. The design and construction phases will typically be managed by Parks and Recreation through the County's Capital Improvements Program (CIP). Within the Parks and Recreation portion of the CIP is a Bikeways Trails Program line item that identifies funding for trail projects.

For on-street bikeway improvements the Division of Public Works (DPW) would have primary responsibility for the design and construction phases with any necessary planning coordinated with Planning and Permitting. Some bikeway improvements will be made as part of the road upgrade projects and will not need separate funding while retrofit type projects will need to be funded on their own.

Municipal and Regional Coordination

This Plan includes numerous trail corridors and bikeway facilities that will connect with and through some of the municipalities to into neighboring counties. As necessary there may be a need to coordinate projects at the planning phase to ensure the trail or bikeway facility is compatible as it crosses jurisdictional boundaries. There may also be opportunities to share the funding of a facility.

Community & Corridor Plans

Community and Corridor Plans will on occasion be adopted as amendments to the County Comprehensive Plan. These corridor plans will often include reference to and or mapping of specific recommendations for bicycle and pedestrian facility within the plan area. Any trail, bicycle or pedestrian improvements recommended in these adopted community and corridor plans would refine or add to what is identified in this Plan.

Development Review Process

The County has opportunities to have trail and on-street bikeway facilities considered as part of developments that go through a site plan and/or subdivision process.

5. Implementation

It is meant to supplement the adopted policy guidance that bicycle and pedestrian accommodations shall be considered in all capital and development projects. During the development review process every attempt should be made to accommodate proposed trails and bikeways regardless of whether the trail will be constructed at time of site development or later. This accommodation shall be made in one or more of the following ways:

- Construction of planned facility: Completed design and construction of facility in accordance with prescribed design standards. In the case of a project funded by a private developer, the developer would be responsible for frontage and justified offsite construction as well as site integration with the facility.
- Fee-in-lieu: A fee-in-lieu may be permitted by the Planning Commission if costs are deemed excessive, either from a cost per dwelling unit basis or a larger than normal cost element, such as a bridge, is required to accomplish the project; or if right-of-way cannot be required. The fee-in-lieu could then be applied to this area or anywhere else in the County.
- Dedication of right-of-way: if the development requires a subdivision process then any trail alignment must have a right-of-way dedication to public use. There should also be some reference regarding the timing of the dedication.
- Reservation of right-of-way: If a specific trail alignment cannot be determined then a reservation should be identified. A provision in a deed which keeps (reserves) to the grantor some right or portion of the property for future purchase by an agency. Reservation should note future public use.

Specific widths for right-of-way dedication or reservation are noted below and shall include adequate space for construction and maintenance. Ranges are noted based on proposed development intensity and expected facility demand.

Bicycle and Pedestrian Facility Right-of-way/ Easement Requirements

Facility Type	Dedicated / Reserved Right-of-way Width
Shared Use Path / Multi-use Trail	15-20 Feet
Natural Surface Trail	10-15 feet
Sidewalks/Sidepath	5-20 Feet or refer to Streets & Roads Design Manual

The County's Adequate Public Facilities Ordinance (APFO) for Roads (Section 1-20) notes the following specific to off-site bicycle and pedestrian Facilities. APFO Section 1-20-31 (F) states:

> *Transportation facilities necessary to mitigate inadequacies shall be determined by the Planning Commission after reviewing the entire record, including…bike and pedestrian needs…when justified to support or complement the development, or mitigate its impacts, may be provided by the developer…*

The Guidelines for Preparation of Traffic Analysis for Development Applications state:

> *Off-site bicycle and pedestrian facilities may be required when there is a reasonable attraction between the development and a nearby attraction, such as between a residential development and a school or train station. When deemed necessary and reasonably implementable, the improvement should not exceed a distance of 0.5 mile for sidewalks and 1 mile for bicycle and trail facilities. A fee-in-lieu of construction may be permitted by the Planning commission if costs are deemed excessive either from a cost per dwelling unit basis or a larger than normal cost element, such as a bridge, is required to accomplish the project; or if right-of-way cannot be acquired.*

Capital Improvement Plan Process

All projects should start with the assumption that some accommodation will be provided. In order for an exception to be made and accommodation not be provided, the provision of a potential accommodation must fall into one of six categories established in a Draft Complete Street Policy:

1. Scarcity of population, travel, and attractors, both existing

and future, indicate an absence of need for such accommodations.

A. The project is not on a designated bike/ped facility – and,

I. Is the road expected to carry less than 400 VPD in the design year?

II. The locality does not want bike/ped accommodations?

B. There is no obvious bike/ped activity (no cyclist or pedestrians observed, no worn paths present) and existing development is only industrial, agricultural, or large lot residential and Comprehensive Plan does not propose uses/densities that can be expected to generate bike/ped activity.

2. Environmental or social impacts outweigh the need for these accommodations.

A. Would right of way needed for accommodation require displacement of homes, businesses, or places of worship?

B. Would provision of accommodation create impact to cultural, historic, or other sensitive environmental resources?

3. Safety would be compromised

A. Would accommodation require a reduction in the current lane width below acceptable standards?

B. Would accommodation termini encourage un safe bike/ped activity?

4. Total cost of bicycle and pedestrian accommodations would be excessively disproportionate to the need for the facility (not applicable for bike/ped specific projects)

A. Does accommodation cost more than 10% of total project cost if not a designated bike/ped facility or 20% of total project cost if a designated bike/ped facility?

B. In the case of major projects (over $500 million), does accommodation cost more than 10% of total project cost?

5. Purpose and scope of the specific project do not facilitate the provision of such accommodations (e.g., projects for the Rural Road Program)

A. Is the project a Rural Road project?

B. Is the project for minor changes that should not directly affect bike/ped activities (such as drainage or turn lane storage extension projects).

C. Is the project of such short length that provision of bike/ped facility would be inappropriate?

D. Is the project a bridge superstructure replacement that does not impact bridge substructure?

6. Bicycle and pedestrian travel is prohibited by state or federal laws.

A. Is the proposed accommodation parallel to and within interstate right of way and not separated by a physical barrier?

B. Is the proposed accommodation parallel to and within limited access right of way where State law prohibits bike/ped traffic?

This policy does not address the specifics of each category nor does it mandate the process used to determine if a project or proposed accommodation qualifies for an exception.

Specific criteria listed are not all inclusive, and other factors relative to the overall topic may be considered. Conversely, even for facilities that may meet the requirements for an exception, special circumstances may dictate that accommodations be provided. If the analysis of a specific bicycle and pedestrian accommodation yields a "yes" answer (meaning an exception is warranted), the project manager or sponsor should still consider if there are practical alternative enhancements that may be provided to improve the environment for bicyclists and pedestrians.

This process should be initially applied to projects at the scoping stage and again at a point when sufficient information is available to determine if cost and environmental exceptions are met or if new information provided invalidates scoping stage assumptions (generally prior to public hearing stage).

The following roads rating system may be used as an analysis, or needs definition, tool that includes ratings for both sidewalks and bicycle lanes/shoulders.

Sidewalks

Measurement	Description
Very Good	Width 5’ or more; ADA std.; 5’ or more offset from street
Good	Width >4’; ADA; some obstructions/minor cracks; >2’ offset to street
Fair	Width >4’; frequent obstructions; cracking
Poor	Width 4’ or less; frequent obstructions; poorly maintained
Very Poor	Width < 4’; frequently obstructed; portions unpaved

Bike Lanes

Measurement	Description
Very Good	5’ bike lane or shoulder provided
Good	4’ bike lane or shoulder provided
Fair	4’ or greater bike lane or shoulder, discontinuous at intersections
Poor	<4’ bike lane or shoulder
Very Poor	Bikes travel in vehicle lane

Costs and Funding Sources

Funding will certainly be a significant challenge in implementing the development of trails and bikeway facilities.

The provision of complete streets without waivers would increase the capital cost of improvements, as well as the right of way needs. If funding were to be held constant, then fewer miles of roadway would be built. However because this would be offset to some extent by the increased tax revenue generated by a more attractive community, more capital expenditure should be granted to provide the more complete street section

The following table shows planning level cost estimates for different phases of shared use path development and maintenance.

Type of Facility Surface	Project Phase	Cost per mile
Shared Use Path-Feasibility	Planning	$5,000 - $10,000[2]
Shared Use Path-Engineering	Design	$30,000 - $125,000[3]
Shared Use Path (Asphalt)	Construction	$200,000-1,000,000[1]
Annual Operations / Maintenance Cost	Maintenance	$1,500 - $2,000

1. Construction costs can vary widely depending on bridge needs, steep slopes, etc. figure does not include r-o-w acquisition;
2. Cost varies based on total length and difficulty of implementation of route (crossings); 3. Typically 10% - 15% of construction cost

In Frederick County, all grants for bike, trail and pedestrian projects, whether their source be state or federal, are administered either through the Metropolitan Washington Transportation Planning Board or the Maryland Department of Transportation (MDOT). The following is a list of available state and federal funding programs.

State of Maryland Funding Programs

ADA Retrofit (Fund 33). A fund to upgrade existing sidewalks, curb ramps, and driveway entrances along state roadways to be ADA-compliant.

Requirements:

- Fund 33's purpose is to retrofit existing, non-compliant sidewalks up to the latest ADA standards.
- Projects are not limited to Priority Funding Areas.

Sidewalk Retrofit (Fund 79). A fund to construct missing sidewalk segments to fill gaps within the pedestrian network. The missing segment must be located either in a "designated neighborhood" per Housing and Community Development Article §6-301 or within a Priority Funding Area.
Requirements:

- Local jurisdiction must provide public notice of the sidewalk project and citizens an opportunity to provide input; help secure right-of-way, easements, or right-of-entry agreements; and agree to maintain or repair the sidewalks after completion.
- If a sidewalk is located in a "Sustainable Community" per Housing and Community Development Article §§6-301 and 6-305, construction may be funded entirely by the state.
- If a sidewalk is located in a Priority Funding Area and it is determined that a substantial public safety risk or significant impediment to pedestrian access exists and the adjoining roadway is under neither construction nor reconstruction, sidewalk construction shall be identified as a system preservation project and may be funded 100 percent by the state.
- If a sidewalk is located in a Priority Funding Area and requested by the local government, the construction costs may be split between the state (75 percent) and local jurisdiction (25 percent).

Urban Reconstruction (Fund 84). A fund for streetscape projects that promote safety and economic development.

Requirements:

- Local jurisdiction must help secure right-of-way, easements, or right-of-entry agreements.
- Local jurisdiction must agree to maintain sidewalks and other improvements after completion.
- Project limits must be located within a Priority Funding Area.

Bicycle Retrofit (Fund 88): This is a fund to provide bicycle improvements along state roadways.

Requirements:

- Local jurisdiction must provide public opportunity to provide input and must help secure right-of-way, easements, or right-of-entry agreements.
- In cases of off-road improvements, such as a parallel or shared-use path, the local jurisdiction must agree to maintain improvements after completion.
- The parallel/shared-use path must be within 100 feet of a SHA roadway.
- If a shared-use path requested by a local jurisdiction is within an area designated as a priority funding area under State Finance and Procurement Article §5-7B-02, the cost to construct shall be shared between the state (75 percent) and local government (25 percent). If, however, SHA determines that a substantial public safety risk or significant impediment to pedestrian access exists and the adjacent roadway is not under concurrent construction or reconstruction, SHA may opt to fund 100 percent of the construction, provided funding is available.
- If a shared-use path requested by a local jurisdiction is not within an area designated as a priority funding area under State Finance and Procurement Article §5-7B-02, the construction cost shall be shared between the state (50 percent) and local government (50 percent).

Transportation Alternatives Program (TAP). A competitive federal program funding a variety of transportation-related projects administered by MDOT/SHA. Its objective is enhancing the cultural, aesthetic, historic, and environmental aspects of the intermodal transportation system. Eligible applicants include: local governments, regional transportation authorities, transit agencies, natural resource or public land agencies, school districts and local education agencies, tribal governments, and other local and governmental entities with oversight of transportation or recreational trails.

With respect to bikeways and trails, TEP funding can be used to construct bicycle/pedestrian trails adjacent to abandoned railroad corridors; to install bicycle/pedestrian amenities at intermodal nodes or trailheads; and to construct or rehabilitate bicycle/pedestrian facilities for off-road trails, trailheads, bicycle parking, bicycle lane striping that is part of an off-road system, and bicycle/pedestrian bridges and underpasses.

Requirements:

- Projects must be open to the public and serve a transportation purpose
- Local jurisdiction is responsible for 20 percent of total project cost as a cash match. A TAP grant can cover up to 80 percent of the construction costs
- Project must be open to the public and benefit Marylanders, not a specific group or individual.
- Must serve a transportation purpose, connecting two destinations; TAP projects cannot be solely recreational in purpose. TAP projects may be phased so long as each successive phase continues to serve transportation destinations.
- Must be independent projects unrelated to planned or existing highway projects, unrelated to routine highway improvements, or required mitigation for a planned or existing highway project. TAP projects may be enhancements to larger federal-aid highway projects.
- Must be located on publicly-owned right-of-way or on right-of-way encumbered with a permanent easement held by a state agency or the government agency sponsoring or co-sponsoring the project.
- Must comply with ADA, NEPA, and all other applicable state and federal regulations.

Safe Routes to Schools (SRTS): A program providing funding for education and infrastructure improvements that enable and encourage students walking and cycling to school. A Federal TA funding allocation, of which SRTS is a component, is administered by MDOT-SHA.

Requirements:

• Sidewalk improvements must be within a 2 mile radius of either a state-funded elementary or middle school.
• 20% cash match, must benefit elementary and middle school children in grades K-8

Recreational Trails Program (NRT): A federally funded TAP allocation administered by MDOT-SHA, developing community-based, motorized and non-motorized recreational trail projects.

Requirements:

- Projects cannot exceed $40,000 for new construction and $30,000 for other projects.
- Projects require 20 percent local match.
- Preferred projects: Connect communities with natural/cultural areas or tourism areas, have broad-based community support, link or complete existing trails, mitigate impacts on the natural environment, and involve youth conservation corps or service groups.

Maryland Department of Transportation: Bikeways Program: the objective is to promote biking as a fun, healthy, and environmentally-friendly transportation alternative, supporting plans and projects that maximize the use of Maryland's existing cycling facilities, make needed connections, and support Maryland's bike-sharing efforts. Eligible projects include bicycle plans and feasibility studies; design and construction of infrastructure to better connect communities to transit and other destinations; linkages of local bike routes to state bicycle facilities; and minor retrofits including signing, striping, and grate replacement to enhance use and visibility of on-road cycling facilities.

Requirements:

- Must be one of the following to address network gaps and improve bicycle facility access:
    1. Minor Retrofit
    2. Design
    3. Construction
- Local jurisdiction must apply or State agency can apply with a letter of support from the local jurisdiction.
- Application must include a letter of support from the agency responsible for operation and maintenance.
- Projects require 20-50 percent local match depending on project criteria.

Metropolitan Washington Transportation Planning Board

Transportation/Land Use Connections (TLC): Provides technical assistance to member jurisdictions for planning and design work that may include specific transportation projects and/or related land use and development plans.

Federal Highway Administration

Public Lands Highways Discretionary Program: Program for planning, research, and engineering of highways, roads, parkways, and transit facilities that are within, adjacent to, or provide access to Indian reservations and federal public lands, including national parks, refuges, forests, recreation areas, and grasslands.

Requirements:

- Project must be adjacent, within, or provide access to either an Indian reservation or federal public lands including national parks, refuges, forests, recreation areas, and grasslands.
- Considerations will be given for the following:
    - Federal Land Management Agency (FLMA) priority
    - Indian tribe priorities
    - Private or other public funding leveraging
    - Expeditious completion of project associated with PLHD funding request
    - Addressing safety and "state of good repair"
    - Livability, aspects of which include:
    - Operational improvements
    - Safety improvements
    - Increasing transportation choices
    - Traffic calming
    - Multimodal and connectivity improvements
    - Conflict reduction through access management
    - Livability plans development
    - Improving accessibility and service for economically disadvantaged, non-drivers, seniors, etc.
    - Providing access to a community or a natural resource

Rail Highway Crossing Hazard Elimination in High Speed Rail Corridors: A program for safety improvements to private and public highway-railroad grade crossings along federally-designated high-speed rail (HSR) corridors, including pedestrian crossings.

Requirements:

- Improves safety at a crossing that has had recent or high potential for accidents between pedestrian and/or vehicles and HSR or intercity passenger rail.
- Upgrades a crossing or a series of crossings to create a "sealed corridor" segment utilizing advanced warning technology, four-quadrant gates, or median separators with preference to crossing closures.
- Supports a HSR corridor service development plan.
- Is included in a corridor with active HSR or intercity passenger rail service with programmed capital funding for an increase in service frequency or speeds of 90 mph or greater. Preference to be given to corridors with speeds 110 mph or greater.
- Will generate improvements to existing HSR or intercity passenger rail service, as reflected by estimated increases in ridership, increases in operational reliability, and increases in average and/or top operating speeds, reduc-

tions in trip times, additional service frequencies, and other related factors.
- Demonstrate support from key project partners, including the infrastructure-operating railroad, local governments, and other relevant stakeholders.
- Conforms to FRA's "High-Speed Passenger Rail Safety Strategy" guidance.
- Other factors including:
    - Integration with HSR investments
    - Corridor location
    - Project implementation and delivery
    - Priority safety investment

Transportation, Community, and System Preservation (TCSP) Program: A program providing funding for planning, implementation, and research to investigate and address relationships among transportation, community, and system preservation plans and identify private sector-based initiatives to improve those relationships.

Requirements:

- Projects must be coordinated with state and local preservation or development plans, including TOD plans, promote cost-effective and strategic investments in transportation infrastructure that minimize adverse environmental impacts, or promote innovative private sector strategies.
- Project sponsor must have instituted other policies to integrate transportation, community, and system preservation practices, such as spending policies that direct funds to high-growth areas, urban growth boundaries to guide metropolitan expansion, "green corridors" programs that provide access to major highway corridors for areas targeted for efficient and compact development, and/or other similar programs.
- Project sponsor must have preservation or development policies that include a mechanism for reducing potential impacts of transportation activities on the environment.
- Project sponsor must demonstrate a commitment to public and private involvement, including the involvement of non-traditional partners in the project team such as the private sector.

Other criteria including:
- Livability, aspects of which include:
    - Operational improvements
    - Safety improvements
    - Traffic calming
    - Complete street strategies
    - Conflict reduction through access management
    - Livability plan development
    - State of good repair
    - Safety
    - Expeditious completion of a project
    - State priorities
    - Leveraging of private or other public funding
    - Amount of TCSP requested
    - National distribution

Other Programs

1. FHWA TIGER Grants
2. Program Open Space (MDNR)
3. Maryland Heritage Areas Program (MDP)
4. Community Legacy Program (DHCD)/Sustainable Communities

Requirements:

- Community legacy area–grandfathered
- Area must be in a sustainable community
- Trails running outside of jurisdiction not eligible
- Geo-bond state money–must be for capital improvements
- Street furniture for main street projects and improvements for the connections
- All communities must have resubmitted a sustainable community plan to remain eligible after June 2012
- Follows HUD sustainable objectives–the plan should include coordination with a bicycle plan

Advocacy and Partnership

There are a number of advocacy and partner organizations that support bicycling and walking in Frederick County. Most if not all of these groups had some level of participation in commenting on the update of this plan. Advocates play an important role in the improvement of bicycling and walking conditions in the County.

These groups participate in the following ways:

- Reviewing and commenting on County policies, plans, programs and budgets
- Participation of maintenance and monitoring of trail and bikeway facilities
- Participation in bike and pedestrian use documentation

- Participation and sponsorship of promotion and encouragement events
- Playing an active role in adult and student cyclist and pedestrian safety education
- Participating in review of infrastructure projects
- Participation in related County boards & commissions
- Communicating with Elected Officials and staff regarding project prioritization
- Partnering in funding or fund raising of program efforts

Project and Project Phasing Selection Criteria and Prioritization

The prioritization process, outlined in Exhibit #7 of the Appendix and primarily for helping to prioritize off road trail projects listed in Chapter 4, would feed into the process of identifying which trail corridors should be funded in the county's Capital Improvements Program (CIP) for more detailed corridor studies and eventually design and construction, and in which priority.

It is a continuing and long term County policy that no land for a pedestrian or bicycle facility ever be taken by condemnation, but rather from willing landowners. As a result, those projects in existing public rights of way and on land where cooperating land owners are known, would move up in priority relative to those projects that cannot claim this benefit.

Action Items

The following actions items are recommendations, some of which include action items from the 2010 County Comprehensive Plan that are still relevant to the implementation of this Plan. Some of these items may require coordination with other county agencies.

- Revise the County's Street Design Manual to include design specifications for on-street bikeway facilities. A reference to the adoption of a complete streets policy should be included along with appropriate complete streets design concepts. Coordination with the Division of Public Works (DPW).

- Update the County's Trail Design Standards and Planning Guidelines document that was adopted in 2003. Coordinate with the Division of Parks and Recreation; incorporating many elements of the 2015 MDOT Guidelines; include a safety action plan.

- Develop a prioritization system for identifying bike lane/shoulder and multiuse trail priorities that would be used to assist in the nomination of new project starts in the County Capital Improvements Program (CIP); use of the LOS graphic, noted in Figure 3.1 could be part of the assessment, as well as Exhibit #7 in the appendix.

- Accelerate the implementation of sidewalk, bikeway and trail projects far in excess of past performance; sidewalks and bikeways being implemented on road projects as necessary under a complete streets policy.; looking for developer and Public-Private Partnership funding opportunities,

- Perform preliminary engineering on the Main Street Connector Trails/Bikeways between the city of Frederick and 1) Thurmont, 2) Middletown and 3) Brunswick, with the grant leveraged to facilitate these connectors, as well as the top priority trails based on the prioritization system mentioned above.

- Perform short annual assessments that reports on progress, measures performance and attainment of goals, and identifies the top projects for future funding.

- Establish an ongoing Pedestrian and Bicycle Retrofit Program line item in the DPW Highways section of the County CIP. This program would fund sidewalk and crosswalk improvements and bicycle facility improvements on existing county roads, especially those accessing schools, parks, and Transit stops.

- Establish a full-time position that would include bicycle/pedestrian planning duties, which would champion the implementation of this plan, perform outreach to our partners, and manage projects.

- Form a bicycle and pedestrian advisory committee that would represent the interests of the non-motorized community and advise the county on community needs and ways to meet those needs, whether they be education, programs, safety/operations or capital improvements. This committee could either be a subcommittee under the two established local transportation advocates, the Transportation Services Advisory Committee (TSAC) or Frederick Area Committee on Transportation (FACT), or be an independent committee facilitated by County staff.

- Maintain a partnership with Frederick County Public Schools staff to assure safe routes to schools for the improvement of pedestrian access to County schools.